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ABSTRACT

This annual review is intended as a means for disseminating information and views on agricultural education and training, and related subjects to the United Nations, Food and Agriculture Organization (FAO) Member Governments, FAO National Committees, national and international experts and institutions. Topics include: (1) "Training Teachers of Agriculture" by J. A. Sutherland, (2) "Refresher Training of Teachers" by J. P. Chavan, (3) "Vocational Agricultural Training at Navuso Agricultural School, Fiji" by G. N. Bamford, (4) "Practical Work in Sub-Professional Courses in Agriculture" by G. Dick, (5) "The Relation of a School of Agriculture to the University" by E. Ensenat, (6) "Teaching Agriculture in Schools: An Example from Malawi" by I. S. MacDonald, (7) "Training on Cereals Breeding and Improvement in the Near East Region--A Cooperative Effort" by A. Hafiz, (8) "Problems in Fishery Education and Training" by Y. Miyake, (9) "Training for Dairy Teachers" by A. W. Marsden, (10) "Agricultural Education and Training in the USSR" by B. J. Sestan, (11) "Tanzania Faces the Challenge of Social Change as it Trains Women for Rural Development" by L. A. Marin and J. S. Ritchie, (12) "Training for Control of the Desert Locust" by G. Singh, and (13) "The Hydrology Training Institute (Epwapda) Bhagyakul, East Pakistan" by L. H. Young. (SB)

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ANNUAL REVIEW OF SELECTED DEVELOPMENTS

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AGRICULTURAL EDUCATION AND TRAINING

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Better Farming series

Better Farming is a series of twentry-three booklets, originally issued in French by Agri-Service-Afrique of the Institut africain pour le développement économique et social (INADES), and now made available in English by FAO. The series covers in a very simple form all practical aspects of agriculture, for use by village-level extension instructors, farmers' groups and schools, especially in developing countries, and should find widespread use at the village and junior levels of agricultural training. The price is $ 0.25 or 10 p. each, and the booklets may be purchased individually or as a complete set.

The original texts were prepared for an African environment and this is naturally reflected in the English version. However, it is expected that many of the books in the series will also be of value for training in many other parts of the world. Adaptations can be made to the text where necessary owing to different climatic and ecological conditions. Applications for permission to issue any or all of them in other languages will be welcomed and should be addressed to the Director, Publications Division, FAO, Rome.

The full list of titles is:

1. **The way to work. The living plant**
2. **The plant - the root**
3. **The plant - the stem**
4. **The plant - the leaf**
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6. **The soil - man and the soil**
7. **The soil - how the soil is made up**
8. **The soil - the living soil - working the soil**
9. **The soil - working the soil (continued)**
10. **The soil - conserving the soil - improving the soil**
11. **Animal husbandry - introduction**
12. **Animal husbandry - feeding animals**
13. **Animal husbandry - looking after animals - how cattle reproduce**
14. **Animal husbandry - what cattle produce**
15. **Keeping chickens**
16. **Food crops**
17. **Market gardening**
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Animal Husbandry series

This new series, **Notes for Students of Animal Husbandry**, by Dr. C.J. Price, is intended primarily for students for whom English is a second language, who are at the middle grade teaching level (equivalent to Technical Institute or College) and are studying agricultural science with a view to becoming agricultural or animal health assistants in agricultural and veterinary departments. The price is $ 0.50 or 20 p. each volume.

The series comprises:

- **Poultry Husbandry I**
- **Poultry Husbandry II**
- **Practical Parasitology: General Laboratory Techniques and Parasitic Protozoa**
- **Practical Parasitology: General Laboratory Techniques and Parasitic Protozoa-Laboratory Cards**
- **Practical Parasitology: General Laboratory Techniques and Parasitic Protozoa - Instructor's Guide**
- **Histology** (in preparation)

Applications to translate these volumes into other languages will be welcome, and should be addressed to the Director, Publications Division, FAO, Rome.

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AGRICULTURAL EDUCATION AND TRAINING

Annual Review of Selected Developments

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1971

AGRICULTURAL EDUCATION AND TRAINING

Annual Review of Selected Developments

This Review is a medium for the dissemination of information and views on agricultural education and training, and related subjects, to the United Nations, FAO Member Governments, FAO National Committees, national and international experts and institutions. The Review appears annually in English, French and Spanish.

Readers requiring more detailed information concerning the contents of the Review, or who are interested in obtaining reprints of articles, should write to: The Editor, "Agricultural Education and Training - Annual Review of Selected Developments", Rural Institutions Division, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy.

The opinions expressed in this document are the personal views of the individual authors and do not necessarily reflect those of FAO.

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Cover Photo: "A Rural home economist teaching a mother in Tanzania how to cook more nourishing foods." (FAO photo by Florita Botts). (See article on page 51).

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NOTES AND COMMENTS

World Conference on Agricultural Education and Training

The World Conference on Agricultural Education and Training, organised jointly by FAO, UNESCO and ILO, took place in Copenhagen from 28 July to 8 August 1970. The Danish Government was a gracious host to the Conference.

The full report of the Conference, in two volumes, has been published in English, French and Spanish, and is available on application to The Agricultural Education, Extension and Rural Youth Service, Rural Institutions Division, FAO, Rome.

The Council of FAO, at its 56th session in June 1971, considered the report of the Conference and agreed to the proposals for action set out in the document. These were as follows:

"It is urgently necessary that Member Governments pay particular regard to a number of fields which were emphasised at the Conference and which are of immediate concern -

(a) The planning of national systems of agricultural education and training closely related to the general educational system and geared to national needs.

(b) The development of national systems closely related to local, cultural and ethnic needs and relying less heavily than in the past on imported systems.

(c) Increasing emphasis on developing agricultural education and training at all levels toward specific objectives in economic and social development.

(d) Relating the limited investment available for agricultural education and training to national planning, to manpower requirements and to employment opportunities.

(e) Assisting in bringing about a closer relationship between agricultural education and training with research and the advisory and extension services.

(f) More work in all aspects of educational communications, that is, not only in the fields of textbooks and audio-visual aids, but also in such subjects as broadcasting, programmed learning and information retrieval.

(g) Greater emphasis on agricultural education and training as a continuing process for all ages and both sexes of the rural community.

(h) A very substantial effort at the intermediate and lower levels of agricultural education and training oriented to preparing people for rural change.

In all these areas FAO will do its utmost to support Member Governments by providing assistance and carrying out work. In order to make its contribution to Member Governments more effective, FAO must, in addition, place particular emphasis on the following:

(i) Encouragement of experimentation in new ideas and new forms of educational activity with particular attention to the mass training of farmers and other rural groups.

(ii) Promoting studies in national systems in order to obtain much needed data on what exists and what has already been achieved to reinforce the advice provided by FAO to Member Governments.

(iii) Strengthening cooperation based on complementarity with UNESCO and ILO, as well as the bilateral agencies and NGO's to provide more integrated service for governments and to make the best use of the limited resources available."

Council stressed the need to regard agricultural education and training as an essential element for economic and social progress. Attention was drawn to the importance of non-formal education for the masses who receive little or no formal instruction; to the need for collective or group action through farmers' organizations or cooperatives, and to close cooperation with producers' organizations, in developing agricultural education and training programmes.

Stress was also laid on the importance of inter-departmental and inter-agency cooperation in the overall planning of action and assistance at country level.

Agricultural Employment

Employment and income distribution are receiving increasing emphasis as development objectives in the planning by developing countries and in the thinking of the international agencies. Employment or, more accurately, the opportunity to earn a livelihood, is now one of the major human problems in the developing countries.

Why is FAO vitally interested and concerned in this aspect of development? Because no less than 75 per cent of the population of the developing world live in rural areas. Most of these people are dependent on agriculture, in one form or another, for their livelihood. And for another 50 years, the numbers are expected to increase substantially. An increasing role for agriculture as the major source of livelihood for the people in these countries seems inevitable.

To help to clarify its role, policy and programme in the employment field, FAO has recently set up an inter-departmental Working Group on Agricultural/Rural Employment. In addition to an expanding programme of work in this field, a major policy paper will be prepared for consideration by member countries. This will deal with the potential contribution of agriculture, forestry and fisheries to employment, and with the choice of appropriate policies and programmes open to governments.

High among the aspects of employment creation which are of particular concern to FAO and to our member governments is that of manpower planning, development and training in relation to employment-oriented policies in the agricultural sector. This covers not only the resources and needs of trained agricultural manpower, and their effective utilization, but also the appropriate training and development of all sections of the farming community.

Directory of Agricultural Education and Training Institutions in the Near East

A "Directory of Agricultural Education and Training Institutions in the Near East" has been prepared by the Agricultural Education, Extension and Rural Youth Service of FAO. This can be considered a first step towards the systematic data collection and review of existing education and training facilities for agriculture and related sciences in the Region.

Over 200 institutions at all levels from farmers training centres to universities have been reviewed in 16 countries, covering about 12.4 million sq. km. of territory with a total of 18.7 million inhabitants of which nearly 70% live in rural areas.

The data included in the "Directory" are of a basic nature. They may, however, help to acquire an accurate image of the present state of agricultural education and training in the region as well as providing a background for future policy actions by helping in the identification of neglected areas. The "Directory" will also provide useful information for prospective students.

International Council for Educational Development

Mr. Philip H. Coombs, Vice-Chairman of the ICED, former Director of UNESCO's International Institute of Educational Planning in Paris, is carrying out a research project on non-formal education for rural and agricultural development. He is working in conjunction with various international organizations, as well as the Ford and Rockefeller Foundations, and the AID Agricultural Development Council.

Non-formal education refers to a wide assortment of organized, systematic educational and training programmes outside the formal system, designed to generate skills and knowledge relevant and useful to particular sub-groups in the population and labour force, e.g. farmer training centres, extension services, apprenticeship and on-the-job training schemes, rural youth programmes, work-oriented literacy projects and in-service training for rural administration, small industry and farm cooperative management.

Enquiries regarding the project should be sent to Mr. Coombs at the following address: River Road, Essex, Connecticut 06426, U.S.A.

UN Conference on the Human Environment (5-16 June 1972) Stockholm, Sweden

FAO has a close interest in many activities affecting the human environment and also in various forms of education which have a bearing on the subject. Nearly all agricultural education carries built-in environmental aspects. To learn about ecology, soil structure, animal health or forestry management implies being conscious of environmental problems, and the extension services are, or should be, closely involved in aspects of environmental training.

Readers of the Review who are interested in further details of this subject, as it affects the UN Conference, are referred to the Secretary-General, UN Conference on the Human Environment, Palais des Nations, Geneva, Switzerland.

Publication: "Handling and Storage of Food Grains in Tropical and Sub-Tropical Areas"

It is well-known that high losses occur during handling and storage of food grains in developing areas. It is of vital importance to try and reduce these losses at all levels; equally for the subsistence farmer who is trying to preserve his food supplies between one harvest and the next; and in those areas where the "green revolution" has led to enormous expansion in the production of cereals. Much of this increased production is being wasted due to deterioration and lack of know-how in the proper handling and correct storage methods.

FAO has recently published an Agricultural Development Paper (No. 90) in English, French and Spanish, entitled: "Handling and Storage of Food Grains in Tropical and Sub-Tropical Areas". The manual has been prepared for FAO by Dr. D.W. Hall, formerly Director of the Tropical Stored Products Centre, Tropical Products Institute, England.

This manual sets out the causes of grain loss, deterioration and contamination, methods of drying and storage, the design of storage facilities, and also methods of fungus, insect and rodent control methods. It is primarily intended for agricultural and public health officers, for those responsible for designing storage and marketing facilities, and for agricultural training colleges. It should also be useful to those who may be engaged in preparing extension material for welfare officers, warehousemen, traders and farmers in tropical and sub-tropical countries.

CERES, FAO Review

CERES, the FAO Review, Vol. 4, No. 3, May-June 1971 (No. 21) is devoted to the subject of education. Articles are contributed by: Philip H. Coombs, Andrew Pearse, Joseph Hutchinson, Lê Thành Khôi, Javier Prats-Llauradó, Roland Colin, Paulo Freire.

Copies of this Review may be obtained from CERES, Circulation and Advertising, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy, or from any of the FAO Sales Agents throughout the world, at a cost of 1 dollar.

Course on the Management of Fishermen's Cooperatives

In the development of fishermen's cooperatives, one of the major difficulties is the standard of management. FAO, in collaboration with the Swedish Agency for International Development (SIDA) and the International Cooperative Alliance (ICA), will hold a course on "Management of Fishermen's Cooperatives in India", probably in March 1972 in Bombay.

The course will last four weeks and will be attended by some thirty managers of fishermen's cooperatives from India and the South-East Asian region. It is envisaged that it will be followed by similar courses in other regions.

Ad Hoc Consultation on Fishery Education and Training

An Ad Hoc Consultation will be organized in November 1972 by the FAO Department of Fisheries, attended by about 20 experts. The Consultation will discuss the training of personnel for the primary sector such as fishermen, skippers, engineers, their teaching staff and extension officers, and appraise existing programmes and facilities in order to identify measures to be taken at the national, regional and international levels.

This Consultation replaces the Technical Conference on Fishery Education and Training originally planned for 1972.

Education and Training in Meat Production

An Ad Hoc Meeting on Education and Training in Meat Production, Handling, Hygiene and Marketing, convened by FAO, was held in January 1971 in Rome. The report of the meeting contains the working papers, summaries of the discussions held and the recommendations for future action which were adopted at the meeting.

Meeting on Dairy Education

The Second FAO/Danish Ad Hoc Meeting on Dairy Education was held in Rome, 23-27 August 1971. An Evaluation Report on the FAO/Danish Training Programme was discussed, together with future plans for the Programme.

FAO/WHO Panel on Veterinary Education

The third meeting of the FAO/WHO Panel on Veterinary Education was held in Rome, 12-16 July, 1971, and the discussions centred on the training of auxiliaries for veterinary services. A report is being prepared in the three official languages.

Publication: "Guide to the Preparation of Overhead Transparencies"

Overhead projectors are steadily increasing in popularity as items of instructional equipment. Properly used, they can be a highly versatile teaching aid.

A guide to the preparation of transparencies for use in projectors has been prepared by Miss Yvonne Kuhn and this is being issued as an 'Occasional Paper'. Copies may be obtained free of charge on application to The Agricultural Education, Extension and Rural Youth Service, Rural Institutions Division, FAO, Rome.

TRAINING TEACHERS OF AGRICULTURE

by J.A. Sutherland

One of the chief recommendations of the World Conference on Agricultural Education and Training was that the whole problem of training agricultural teachers requires urgent attention by the developing countries. Such training must provide for many categories of teachers such as rural extension workers, teachers in rural schools, instructors in technician training and those who teach in home economics, nutrition and other related fields.

It is not a satisfactory solution to the problem of providing teachers of agriculture to send a few individuals to teacher training institutions overseas. The first priority is to have local people trained to take charge of teacher training courses in technical colleges or teacher training colleges within the country.

Programmes for training agriculture teachers need careful planning. Not only must they be related to the subject matter areas in which teachers will work, but they must also take account of the kind of instruction in which teachers will engage.

Because of the varieties of training which have to be provided, it is useful to approach the problem of planning in the light of principles. These are:

1. That agricultural education at any level succeeds best when it involves an understanding of the basic principles as well as the techniques of agriculture. As far as possible teachers must be trained to understand basic principles and to teach them wherever circumstances permit. Courses of teacher training which deal only with training in techniques fall short of what is desirable.

2. That in training teachers for any level of instruction, the courses must reflect the need for teachers to have more knowledge than they will be required to pass on to their students. The prestige of a course depends in part on whether it is sufficiently challenging. Courses of training need to be as demanding as the ability of students permits.

3. That all teachers need proper pedagogical training including study of teaching techniques together with varied practical experience and supervised practice teaching. Training is also needed in interpersonal relationships. Where institutions of several kinds are training agriculture teachers, the best use of scarce resources might be made if teachers' colleges assumed responsibility for the pedagogical aspects of the training of these teachers.

4. That success in teaching agriculture depends on whether teachers are aware of the important social, cultural and economic factors affecting such education in their country. Courses of teacher training must include a study of the operation of these factors as well as the social and economic repercussions of agricultural change in a society.

5. That courses of training for agriculture teachers are successful only if they provide adequate experiences of a practical nature as well as theoretical instruction.

It is impossible in a short paper to deal adequately with all the facets of teacher training programmes, but some comments may be made on three aspects - the content of courses, the place of practical work and pedagogical training. The following remarks apply specifically to the training of those who will teach agriculture in rural schools in developing countries.

What an agriculture teacher should know

The central problem in training teachers of agriculture is to select the content of courses so that no important area of training is neglected. An agriculture teacher is properly prepared for his task only when the curriculum leads him to an understanding of each of the following:-

The importance of agriculture in his country.

The teacher must understand the extent to which the national economy is dependent on agriculture and the effect which the improvement of agricultural production might have on the standard of living. He must understand the structure of the country's agriculture and the local and world marketing situation.

Agricultural progress in other countries.

To teach agriculture effectively the teacher needs to know how agricultural progress in other countries is being achieved through the application of agricultural science, modern agricultural technology, knowledge of agricultural economics and the new techniques of farm management. This means that courses need to be provided in each of the following areas:-

(a) Agricultural science

This course must be based on an introductory study of the soil and the biology of plants, animals and microbes. The emphasis in this course should be on the physiology of organisms, expecially those physiological systems of greatest significance for production; thus in animal studies the emphasis should be on digestion, reproduction and lactation.

In selecting areas of agricultural science for study, emphasis should be placed on the major factors of agricultural production, that is to say:-

- how to improve the nutrition of plants and animals to make them grow better.

- how to protect plants and animals from pests and diseases.

- how new varieties of plants and animals can be used to raise production.

- how climate affects plants and animals and what can be done to lessen the harmful effects of climate.

(b) Agricultural technology

This course should include reference to topics such as the following:-

- farm machinery
- fencing, yards and houses for animals
- storage of farm products
- modern processing methods
- water conservation and irrigation
- maintenance and repair of machinery
- internal combustion engines.

(c) Agricultural economics

Possible topics for this course might include:-

- money as a medium of exchange and an index of value
- how supply and demand affect prices in a capitalist society
- how prices are controlled in a socialist society
- inputs and outputs in agricultural production
- costs in agricultural production; fixed costs and variable costs.

(d) Elementary farm management

Suggested topics for this course might include:

- what is management?
- steps in decision-making
- choosing the best alternative
- making a farm budget
- how to assess risks
- how to obtain credit
- how to make use of cooperatives, etc.

Agricultural progress in his own country.

The agriculture teacher must form an opinion about the reasonable prospects for the improvement of agriculture in his country and base his teaching on this estimate. Such an estimate should be made in respect of each of the main types of agricultural production in the country. Of the possible types of production, two only are considered in order to reveal the bases on which an estimate might be made.

(a) Cash cropping

The teacher needs to know that the improvement of cash cropping may be limited by any of the following factors:-

- low incentives. Incentive may be affected by low prices or by landlords who prevent the farmer from having a reasonable share of the harvest.

- land tenure. Unless the farmer has security of tenure, improvement of cash cropping may be impossible. The teacher should know the features of good land tenure systems and the steps which must be taken in setting up such a system - registration, survey, land courts and land transfer procedures.

- credit facilities. The farmer may not be able to borrow money because of poor credit facilities or because of avaricious money lenders, etc.

- technical advice. The farmer may not have proper access to technical help and advice.

- poor infrastructure. The improvement of cash cropping depends on the existence of adequate local facilities such as markets, transport, roads and various agricultural services.

- farm size. Shortage of land and small size of farm holdings may limit the improvement of cash cropping.

- cultural beliefs. In some societies cultural beliefs may tend to prevent the widespread adoption of modern techniques of agricultural production. For example, in some societies nature is accorded equal status to man. A natural corollary of this belief is the conviction that it is wrong to take any form of life needlessly. This is the reason why some farmers may refuse to prune bushes or to desucker their bananas when advised to do so. The teacher must try to identify which of the above factors may set a limit to the improvement of cash cropping in his country.

(b) Subsistence farming

The teacher needs to understand that the improvement of subsistence agriculture may be limited by a number of factors such as:-

- lack of incentive to change which may have a cultural basis.
- a low level of general education in farmers may prevent them from understanding the reason for improved methods. Programmes of functional literacy might be used to overcome lack of general education in farmers.
- lack of facilities for farmer education.
- lack of capital resources.

What agricultural education is needed in a country

An agriculture teacher performs his task better when he understands the function of each level of agricultural education and its contribution to the total pattern of agricultural education in the country. Important levels are:

(a) University education in agriculture or a supply of expatriate graduates to undertake agricultural research.

(b) Facilities for training extension workers -

- a high level of training for those who will be advising cash croppers.
- a lower level of training for those assisting subsistence farmers.

(c) Facilities for vocational training -

- farmer education; farmer training centres for literate farmers; courses of functional literacy for illiterate farmers.
- future farmers; school courses of vocational or pre-vocational agriculture.

How to design a suitable school syllabus in agriculture

Althouth a teacher is usually expected to follow a particular syllabus, it is an advantage if he has some thoughts about syllabus design. A suitable school syllabus should include the following components:-

(a) The importance of agriculture in the country.

(b) Some agricultural science, especially:-

- how climate affects plants and animals
- how plants grow
- how animals grow
- how soil helps plants to grow
- the main factors of plant and animal production viz; nutrition, genetics, disease and climate.

(c) Study of some industries of local importance:-

- subsistence crops like taro, yams, coconuts, cassava, sweet potatoes, etc.
- subsistence animal production
- cash crops like cocoa, coffee, tea, vanilla, tobacco, rubber, oil palm, etc.
- animal industries such as poultry, pigs, cattle, goats, etc.

(d) Practical experience in raising crops and animals so that children are shown modern techniques and can practise them.

(e) Simple agricultural economics:-

- advantages of using money
- interaction of supply, demand and price
- kinds of markets, etc.

(f) What is needed for modernizing agriculture in his country:-

- secure land tenure
- sufficient incentives
- availability of credit services, etc.

Practical work

No course of training agriculture teachers can be fully successful in the absence of a proper programme of practical work. Practical work of different kinds must be provided and the range of these activities becomes apparent when the nature of life is considered.

Living things show a number of successive levels of organization, each level showing a higher degree of organization than the one beneath it. Thus there is a degree of organization at the molecular level; above this there is the level of cellular organization, followed by organization at the tissue and organ levels and then organization at the level of the organism itself. There are yet higher levels of organization, for organisms show a degree of organization at the population level and finally there is the level of the ecosystem.

The categories of practical work provided should correspond to the levels of organization at which agriculture is studied. It is a common fault of many practical programmes that they stop at the level of the single organism. Practical work should also be provided at the population and ecosystem levels. Thus at the population level simple studies of plant competition and animal behaviour are appropriate. At the level of the ecosystem studies can be made of climate/soil/plant/animal relationships in a particular area.

Some useful principles regarding the provision of practical work are as follows:-

(a) The practical work should be related to the theory in the classroom and be an integral part of it.

(b) In general it is preferable if practical work precedes the relevant theory in order to provide a sound basis of experience for the development of concepts.

(c) In general the most suitable forms of practical work are those in which the student is mentally active. Activities which involve measuring, recording, comparing, drawing, inferring, etc. are to be preferred to those in which the student is merely asked to perform some physical activity.

(d) It is very desirable that students in training should actually perform the kinds of practical work which they will later expect their pupils to carry out.

Professional training

It can be taken as self-evident that a course of training for agriculture teachers must include a discussion of appropriate teaching techniques and the opportunity to practise these techniques in the classroom situation.

But as well as training in techniques there is a need for the student to be given training in inter-personal relationships. This is the aspect of teacher training which has been sadly neglected in colleges throughout the world. Some modern attempts to meet this need include the following:-

(a) An analysis of the classroom situation; pupil/teacher relationships, pupil/pupil relationships; sources of motivation in the classroom.

(b) Studies using the micro-teaching approach.

(c) The provision of a graded series of inter-personal experiences for the student teacher in order to develop his image of himself and his educational impact on others. It is essential that the student-teacher develop an understanding of how he may best use himself as an educational instrument. Unless this is done he merely possesses a knowledge of certain techniques but does not have the ability to use them effectively.

(d) An insight into the techniques of group dynamics can be useful. In such a study it is important to show its relevance to the teacher's behaviour and the effect of this on the behaviour of the group and on the individual pupil.

REFRESHER TRAINING OF TEACHERS

by J. P. Chavan

Every other year since 1958 the International Centre for Agricultural Education (ICAE) organizes a course attended by more than 100 participants. They have been held at the Technicum Agricole Suisse at Zollikofen near Berne. The teachers who attend come to pool their problems and to re-examine the basic problems of their profession. This refresher course is not only useful, but may be considered essential. During the first three weeks, which constitute the main seminar, questions of pedagogy and teaching methods, the study of the sociology and psychology of youth and the approach to new methods form the subject of papers by well-known experts. These lectures are further developed in working group discussions.

In 1970, 122 teachers, directors of schools of agriculture and heads of agricultural education departments from over 50 countries took part in the main seminar. Sixty two persons joined in the additional two week seminar reserved for participants from the developing countries. Whereas the courses were originally intended primarily for teachers, it is now noticed that the number of participants occupying positions of executive responsibility in agricultural vocational training, directors of schools and even university professors is increasing each time.

At the main seminar 18 teachers, including 12 foreigners, gave participants the benefit of their experience. Mostly well-known experts, they contributed to our work a note of high quality.

It is not possible to summarize in a few lines the statements made by the speakers or of the ideas discussed and even hurled around during this seminar. The presence of teachers from the five continents expressing themselves in three languages and describing experiences from often widely differing environments renders it difficult to formulate a synthesis of the proceedings. This will be the purpose of the final report, which will furnish a more comprehensive picture of the discussions.

Below are set out the main conclusions and central themes which emerged from the debates. Although many statements might have been clearer in their original contexts an attempt is made to present some of them:

A. General

The first three conclusions have been subjected to thorough examination. The aridness of the text perhaps does not show clearly enough the breadth of the field of activity covered:

1. Agriculture must become a recognized profession and no longer be simply a way of life; this principle is valid both for industrialized and for non-industrialized countries.

2. Education must help to train man; school curricula should be adjusted accordingly.

3. The authorities must take all possible steps to draw up good study plans and, in particular, must rethink them from time to time.

While the other conclusions do not possess the scope of the preceding ones, they are no less fundamental:

4. Before setting up a new school system, it is essential to take account, first, of agricultural and natural conditions, and then of social and human conditions.

5. For the developing countries, the most pressing problems must be dealt with and, first of all, it is necessary to conceive an accelerated and functional agricultural training.

6. In the developed countries the prime concern is to provide basic training broad enough to provide youth with the largest possible number of options in regard to their future.

7. The knowledge of the mass of farmers must be raised and they must also be provided with the services of the technicians they need.

8. Each school should keep in close touch with its former pupils.

B. Pedagogy and teaching methods at the secondary level

1. Humanization of relations between teachers and pupils, by which is meant better understanding, depends primarily on the atmosphere and spirit prevailing in the school.

2. The teacher must be in order to teach, that is, he must teach with all his being. This principle is simultaneously a programme and a line of conduct.

3. It is not appropriate to start specializing in matters concerning production at the lower and middle secondary level until young people have acquired an adequate basic general education.

4. From the pedagogical point of view, the pupil must not be inundated with pictures, any more than with written or spoken words; there must be a proper proportion of all the communication media.

5. Different forms of oral and written tests, compositions, standard questions and practical exercises must be combined so as to arrive at the most accurate possible assessment of the pupil.

6. It is not possible to transform a poor teacher into a good one simply by giving him expensive modern audio-visual aids.

7. The teaching machine (programmed learning) is of value only if its work is supplemented by a pedagogical and human element, which must be dominant; the personal influence of teaching therefore retains its full value.

8. The teaching of agricultural economics should be directed primarily at the farm, especially at middle secondary level; this teaching must be well illustrated.

C. Continuous education

1. It is essential to bridge the generation gap by further teaching and continuous education.

2. Continuous education opens up a new society for the worker and especially develops his creative abilities.

3. Like other callings, agriculture must have access to continuous education.

4. Refresher training must include all disciplines but must place special stress on psychology, pedagogy and teaching methods.

5. The theme of the 1970 ICAE Course was "Education for tomorrow, myth or reality?" To this question we could reply: "It is certainly not a myth but it is not yet a reality".

These conclusions perhaps have much in common with those reached by the 'World Conference on Agricultural Education and Training' in Copenhagen. There is nothing surprising about this because fundamental problems are the same everywhere; some participants attended both events. Furthermore, the International Centre for Agricultural Education has profited by the experience of the agricultural education specialists of FAO, ILO, UNESCO and OECD.

VOCATIONAL AGRICULTURAL TRAINING AT NAVUSO AGRICULTURAL SCHOOL — FIJI

By G.N. Bamford

The new South Pacific nation of Fiji is not poor by world standards. Its per capita domestic product compares for example with that of virtually all African and Asian countries. Yet it shares many of the problems of other developing countries, even if less acutely and on a much smaller scale for its population is just in excess of 500,000 (50 per cent Indian, 42 per cent Fijian, 8 per cent others) and the total area of its 300 islands only 7,000 square miles.

As in many developing countries Fiji has: -

- a rapidly increasing population (2.5 per cent per annum) of which 57 per cent are under 20 years.

- an economy based on agriculture and allied industries which provide employment for the largest section of the population (over 50 per cent). Particularly amongst Fijians, farming is little more than at a subsistence level.

- a problem of finding employment for its youth: Fiji differs however, from other developing countries in that its level of education is comparatively high and therefore the problem is increasingly that of providing employment opportunities for secondary school leavers.

- an educational system that has tended to be academic and literary in nature and therefore has not adequately met the economic needs of the country. It has stimulated in many young people job aspirations that can never be realized. For many, education has come to be regarded as "an escape hatch" from the rural environment.

The first serious attempt to provide vocational training in agriculture in Fiji was in 1923 when the Navuso Agricultural School was commenced by the Methodist Church. With the general rise in educational standards over the past 50 years, the standard of courses offered has changed. Nevertheless all have contained a large practical element and have been designed to provide training for those who will return to farming, or obtain employment as skilled farm workers, plantation managers, or in the lower ranks of Government Service (Agriculture, Forestry, Cooperatives). In the past Government absorbed a large number of students but with the development of tertiary agricultural training it is no longer a major employer and much larger numbers are returning to farming.

To provide appropriate training for these occupations, Navuso has developed 3 major courses: -

(i) General Course in Tropical Agriculture
(ii) Terminal Course in Tropical Agriculture
(iii) Student Farmer Course.

In 1972 it is planned to commence a Rural Training Centre to provide short courses for adult farmers and their wives as well as others involved in rural development.

The general course in tropical agriculture is of 4 years duration and caters for 240 students who, to qualify for entry, must be at least 15 years of age and have completed 8 years of primary schooling. Students who have completed 10 years of schooling may omit the first year. In this course, 40 places are available to students from other Pacific Territories namely the British Solomon Islands, New Hebrides, Tonga and Western Samoa.

To achieve its objectives in this course, the school has had to modify the usual curricula of both secondary and tertiary education systems. Thus while a core of English, Mathematics and Science is taken throughout, these subjects are very much related to agriculture and rural living. The remainder of the curriculum consists of agricultural and allied subjects. In the early years, basic Crop and Animal Husbandry are taught while in later years the emphasis is on Farm Economics and Management. Approximately 13 hours per week are spent in the classroom or workshops and 26 hours in the field.

The Navuso Certificate

From time to time pressure has been put on the school to provide courses which conform more to the normal academic secondary curriculum and therefore can be tested by external examination. Such pressures have been vigorously resisted and the school awards its own certificates at 3 levels - credit, pass and practical. This has become recognized as a useful qualification in the agricultural sector where a Credit certificate is graded as equivalent to a Grade 3 Senior Cambridge Certificate, but it is of little use outside agriculture. This fact is stressed to all students on entry so that they fully understand the nature of the course and the job opportunities available on its completion.

ii. The Terminal Course

This one year course for 24 students was commenced in 1969 and therefore is very much in the experimental stage.

It is designed for those school leavers who have completed their secondary education and must by choice or necessity return to farming. Preference is given to those with some farming experience since leaving school and thus they are several years older than those entering the General Course. In selection, however, there is still a problem of distinguishing those with real farming interests and prospects from those who simply wish to return to school. It is hoped that a closer liaison with field extension workers may help with selection as in this shorter course prior commitment to farming is far more important than in the longer General Course where the opportunities for motivation are much greater.

Subjects covered in the Terminal Courses are entirely vocational and include General Agriculture, Crop and Animal Husbandry, Farm Mechanics and Building Construction, Agricultural Economics and Farm Management, Book Keeping and Business Principles. The proportion of theory to practical work is the same as in the General Course.

iii. Student Farmer Course

This is a type of apprenticeship farming in which no formal instruction is given. Since it differs from the other courses, it will be described later.

Guidelines for Navuso's Training

In Fiji today where, particularly in Fijian Society, traditional communal structures are undergoing rapid change, programmes for vocational training in agriculture must provide for: -

(a) The acquisition of agricultural skills and "know how".

(b) Disciplined work habits and desirable attitudes to manual labour.

(c) The development of an economic sense.

(d) Development of responsible decision-making and behaviour.

(a) The Acquisition of Agricultural Skills and "know how"

The strong emphasis placed on practical training will have already been noted. This is because most students come from a subsistence background and thus have little skill or experience in even the simplest of modern farming techniques.

In the General and Terminal Courses skills are taught: -

(i) In the Field

To give ample opportunity for a large number of students to gain competence in modern farming techniques, a large farm is required. The school is fortunate in having sufficient land (1,700 acres), varying considerably in fertility and topography from rich alluvial flats to rugged infertile hills. Because of this variety it is possible to grow a wide range of crops including most of the major ones of the Pacific Region - coconuts, sugar, cocoa, coffee, bananas, rice, maize, pineapples, citrus, root crops and vegetables. On the animal side, the school operates 2 dairy herds (a grade Friesian and stud Jersey) which together total 300 head. A herd of over 200 beef cattle is maintained, a Santa Gertrudis breeding programme having been commenced in 1969. Poultry (3000) and pigs (150) are also kept while bee-keeping has recently been introduced.

Students work on the various farm sections throughout their course.

While a large scale commercial farm is needed, it has limitations, the most obvious being that training is being given under conditions largely unrelated to those prevailing in the farming community. A vital part of each student's practical training therefore takes place on small typical Fiji farms. On these, students are enabled to apply the skills acquired on the school farm to the type of farm they could well have on completing their course.

(ii) In the Workshop

As well as agricultural skills, the modern farmer needs some competence in carpentry and mechanics. In teaching these the aim is not to produce tradesmen but rather to give training in these unspecialized activities that are likely to be performed in the home or on the farm.

In farm carpentry students receive instruction in the care and use of basic tools, in simple furniture making and building construction so that they can erect their own farm sheds or even houses.

Farm mechanics includes the maintenance of common household appliances such as primus, stoves and pressure lamps, simple rope and leatherwork, soldering and elementary plumbing, hot and cold metal work as well as the maintenance of farm machinery and the making of simple farm tools.

For such training elaborate equipment is not used but that which is likely to be available to the farmer in the future.

(b) The Development of Disciplined Work Habits and Desirable Attitudes to Manual Labour

Teaching of skills is far easier than changing attitudes and developing desirable habits. Regular disciplined work was not necessary in earlier Pacific societies but is essential for farming on an economic basis.

To foster good work habits and attitudes to manual labour attempts are made at Navuso to: -

(i) Make all practical work meaningful in terms of its economic significance and the scientific reasoning behind the operation.

(ii) Develop a spirit of craftmanship, of pride in work well done.

(iii) Provide wherever possible whole days of practical work rather than shorter periods interspersed with theory.

(iv) Demonstrate by staff participation in practical tasks that there is nothing degrading in manual labour.

(c) The Development of an Economic Sense

An "economic sense" needs to be fostered in students whose societies have only recently entered a money economy. At Navuso it is done progressively through practical farming. In the 2nd year of the course, each student operates his own commercial garden plot from which he acquires the profits. The school purposely does not buy students' produce but encourages them to find outside markets. Thus a marketing committee is usually formed by the students themselves and two of their members are deputed each week to sell produce in the market of a nearly town. Thus the concept of cooperation is also developed.

All work on plots is done outside school hours (7 a.m. - 4.30 p.m.) or on Saturday afternoons, and each student is expected to keep simple records of his activities and accounts. The motivation created is illustrated by the fact that recently students asked for 5.30 a.m. breakfast in order to have more time to work in their gardens before starting their normal day's work. Most plots average $30-40* profit per year which is substantial when it is realized that fees for full board and tuition for the year amount to $48.00.

In the 3rd year, groups of 15-20 students are allocated to small typical Fiji farms (8-15 acres) which they will manage for the next 2 years. To keep labour input equivalent to that available to the normal farmer, two members of the group work and live on the farm for fortnightly periods but all planning is done at regular meetings of the whole group. Produce is marketed through the Student Farmer Cooperative and the profits amounting to $200 per year are used to finance an agricultural tour toward the end of the course. This has proved an effective motivating force.

The further development of an "economic sense" occurs for some when they enter the Student Farmer Course.

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* $US 1.00= $F 0.82

Each student is thus given experience in managing a farm of the type he may have when he completes his training. Equally important, he is given an opportunity to apply to his own farming venture the economic and accounting principles he has learnt in the classroom. For many, because of their background of subsistence agriculture, it will be the first time they have realized that farming is a worthwhile occupation, demanding all their mental as well as physical capabilities; and, in addition, one which can provide a satisfactory income and an improved standard of living.

(d) Development of Responsible Decision Making and Behaviour

It is being increasingly recognized that one of the main limitations to agricultural development is the human factor. More is involved in this than the training of skilled operators - there is a need for personal attitudes and values which will lead to integrity and responsible behaviour.

Individual responsibility and decision-making need particular stress where the previous traditional society has been strongly authoritarian. To develop these qualities, students at Navuso are placed in charge of farm sections during their final year. Such qualities are further stimulated by the Student Council, and house and prefect systems where considerable responsibility is in the hands of the senior students. In weekly discussion groups students are encouraged to explore the relevance of their religious faith in everyday living and to build creative attitudes to such real life situations as race relations, sex and marriage, land use and community involvement. Service projects are encouraged, two of which have been assisting in the erection of low cost houses and the establishment of a Youth Centre in the neighbouring town.

The general ethos at Navuso is one of self-help. Students are led to see their work on the farm, in the erection of buildings or in the running of the hostel as important contributions to the school, to the nation and toward the payment of their own training.

Student Farming

Any training for farming must be related to opportunities for settlement, particularly in terms of availability of land and capital. For Fijian students, lack of capital is a major problem.

In 1961, as a follow up to a general vocational training, the Student Farmer Course was commenced. This is a 3 year course for 36 students of 19-24 years of age and its purpose is to: -

(a) Further develop an "economic sense".

(b) Provide further training in farm management, particularly as independent farmers.

(c) Give an opportunity to acquire some capital.

An added benefit is the greater maturity of students on completing the course and therefore a better chance of their successful permanent settlement.

Conditions of Entry

Before he can be accepted into the course a student must: -

(a) Allow the school to control his savings for the period of his training and for the 3 years immediately following.

(b) Agree to return to farming or approved agricultural work for 3 years immediately after completing the course. Failure to do this may mean forfeiture of 50% of his savings.

In selecting students more weight is given to diligence and initiative in field work than to academic achievement. Availability of land on completing the course is also an important factor.

The Course

Each student has 8 acres of rugged, generally infertile land which he farms with a minimum of supervision from the school staff. He and a neighbour share a small house and the associated domestic duties. All farmers are single and are encouraged to remain so for the duration of their course. This has not created any serious social problems as Fijian young men usually do not marry until the mid-twenties. No formal lessons are given but farmers have opportunities for discussion of farming problems at monthly assemblies or their Cooperative Society meetings. Each farmer is expected to keep careful but simple records of his farming operations and accounts, and these are checked monthly. Students generally work individually but for heavy clearing they may enlist the help of others. Half a day per week is given to community work which usually involves the maintenance of roads and tracks or repairs to houses.

To facilitate the purchase of farm and domestic supplies as well as the marketing of produce, a registered cooperative society has been formed, the senior students comprising the executive committee. This Cooperative has an annual turnover of $20,000 and participation by students in its administration is valuable training. In fact, the Cooperative Committee also acts as the main disciplinary body and such misdemeanours as drunkness, absence from work, or selling outside the Cooperative are seen in relation to the Cooperative's operation, and punishment usually in the form of lower prices for produce or a reducation in pocket money, is meted out by the farmers themselves.

Students' Income

Students are not required to pay fees or rent for their house or land and overhead costs for running the course are borne by the Fiji Government.

When the course started in 1961, clearing of tropical rain forest was necessary on the farms and there were no crop sales. Therefore an allowance of $24.00 per month was paid in the first year, decreasing each year, as the farms have developed. In 1970, $8.00 per month was still being paid but in another 3 or 4 years as the farms come into full production it is hoped that the allowance will cease and a student will then be entirely dependent on his farm income.

All income from allowances and sale of produce is deposited in each farmer's Savings Bank Trust Account and from this he pays for all farm inputs. He may also draw $1.20 - $1.80 per week pocket money, depending on the amount of his savings while an additional $1.00 per week can be drawn for purchasing additional food and domestic requirements. By the end of the 3 years a student has usually saved $400 - $1,000, the amount being entirely dependent on his ability to adapt to independent farming on an economic basis.

Since 1963, all new farmers have had to take over partially developed farms and therefore it has become necessary to purchase existing crops from the outgoing farmer. A valuation of crops is made at the end of a student's course and the incoming farmer obtains the capital to purchase these through a loan from the Cooperative Society. It is usually possible to repay this plus 5 per cent interest within the first year.

The Permanent Settlement of Student Farmers

Most students are members of land-owning clans and they endeavour to take out leases on part of this communal land. If his clan has no available land the school assists the farmer to obtain a lease on other tribal or Crown land. For the most part settlement has been dispersed throughout the Group and there are now ex-student farmers in every Province. Intensive settlement of "landless" students commenced in January 1971 and by 1973, ten students will have settled on adjacent farms. A valuable exercise for the future will be an evaluation of the comparative success of the two types of settlement.

Whether settlement is dispersed or intensive, as the Principal controls the farmers' savings for 3 years, there is constant follow up and an opportunity to help in settlement problems though most of this work, including sometimes the administration of the trust funds, is handed over to the Department of Agriculture extension workers. To 1968, 82 per cent of those completing the course entered farming or approved agricultural work while total savings amounted to $30,000.

Objectives Achieved?

The value of vocational agricultural schools in developing countries has rightly been questioned. Their costliness, the remoteness of their training situation from the farming community, the small numbers catered for and the even smaller numbers actually returning to farming have limited their usefulness. To what extent do these criticisms apply to Navuso?

(a) Cost:

Navuso training is possibly the cheapest form of post primary training available in Fiji where it is anticipated 80 - 90 per cent of children will within 10 years receive some secondary education. In the General and Terminal Courses, the cost per student is approximately $150 per annum to which the student contributes $48, the Government $90 and the Methodist Church $12. Costs in academic secondary boarding schools may be 3 or 4 times this figure while in secondary day schools the annual cost may be as high as $100 per student.

Navuso training is inexpensive because: -

(a) Facilities have purposely been kept simple and strictly functional.

(b) Students themselves contribute their productive labour on the farm, in the building of facilities and the operation of the hostel.

In the Student Farmer Course the present annual cost per student is $200 but as farms become fully developed and allowances cease, it should be reduced to $150. For this outlay, students are being given the opportunity to save, through their own farming efforts, up to $350 per annum. Thus expenditure on student farming can be regarded as a sound investment.

(b) Applicability of training

It is true that no institution, no matter how hard it may try, can produce exactly the farming conditions of the community. At Navuso, although the practical training in project and student farms is under more difficult agricultural conditions than generally apply, the marketing conditions, through proximity to markets, are certainly more favourable than in most situations, and students are shielded to a large extent from the social pressures and obligations which make

economic farming so difficult in Fiji. This protection, however, has a positive value in giving students an opportunity to see what they can achieve. But they must eventually face these pressures and discussions during training focus on the extent to which they can meet traditional obligations and still farm economically. Observations of ex-students' farming activities and of their social acceptability show that in most cases an effective compromise has been established.

(c) Output in Relation to Need

Navuso with its output of 60 a year is obviously only a very small part of the total agricultural education programme. Nevertheless the school has provided for Fiji and neighbouring territories a corps of skilled farmers and agricultural workers, who have in many cases taken positions of leadership in the farming communities to which they return. Even though 87% of ex-students of the General Course are engaged in agricultural or allied occupations, the proportion returning to farming has probably never exceeded 50 per cent and has been much less during the last 15 years, although it is once again rising. The projected development of short courses for farmers and their wives will further utilize the facilities available at Navuso and increase output.

Conclusion

Experience at Navuso over the past 50 years would indicate that under certain socio-economic conditions, particularly where population is geographically scattered, institutional vocational training can have a valuable part in an integrated programme of agricultural education and extension, provided it is linked with definite settlement opportunities and is an integral part of the total development plan.

It may be that in some developing countries an adaption of the Navuso training with its large practical component and its emphasis on the development of desirable attitudes to physical labour and to farming as a career, could be of use in training "grass roots" extension workers. So often the training programmes for these are of high technical quality but the products may have little understanding of the farmers' problems or skill in farming operations, and may in fact have developed attitudes and values which make them unwilling or unable to identify with the farming community.

Furthermore, it may be that a Navuso type of post-primary training may be more realistic and less costly for a large number of the rural youth in developing countries than that provided by the traditional academic secondary schools on which society tends to place so much value.

Whatever the applicability of its training to other developing countries, Navuso should continue to play a useful role in the agricultural development of the South Pacific and in particular, that of Fiji.

PRACTICAL WORK IN SUB-PROFESSIONAL COURSES IN AGRICULTURE

By Gordon Dick

There are two areas in which the trainee agriculturist has to develop: the theoretical, conceptual area, and the practical area. The study of the relevant scientific disciplines, agricultural sciences and social and economic theory provide for the former. But to impart practical skills and to build up an initial experience in agriculture during the training years poses problems. Farm work contains a lot of hard and tedious tasks, yet good farming is a highly skilled process demanding of intelligence.

Intelligent Students and Practical Work

In days gone by, a poor family would assist its cleverest child to study for clerical employment and advancement, while farming was left to the duller offspring. The tradition thus created is still with us. Although agriculture draws on a dozen or more disciplines and operates in a complex of physical, social and economic environments, there is still a trend for school authorities to direct students who are doing poorly towards this area of study. But if this tendency is overcome and the best students are enrolled in agricultural colleges, the problem of the practical training component arises. Authorities in agricultural colleges place a lot of faith in the students' overriding interest in agriculture to carry them through the practical drudgery assigned to them. The more intelligent student is less likely to accept long sessions of repetitive, uninteresting employment. If he withdraws from the course, the loss is agriculture's.

The College Facilities

It is usual for an agricultural college to have its own farm areas with a wide range of farm systems. A well established college may have areas of fruits and other tree crops, fields of grain and root crops, gardens with a wide variety of vegetables and spices, pastures for beef and dairy cattle and goats, and pigs and poultry under different systems of management. Added to this scope for student experience are the workshops for learning building trades and machinery operation and maintenance. With a hundred or so students enrolled (and even more so when enrolments are 400 or more), the need for detailed organization to give each student experience in the many facets of each farming activity is obvious. And it is here, I believe, that the whole process gets into trouble. Sound educational practice is abandoned and mechanical rosters are imposed.

The College Goals

The college administrator needs to have his goals and priorities clearly before him. And as student development must take first place, the educational soundness of any practice must be the basis of its selection or rejection.

Doubtless, every college administrator would like to have his college and its surroundings in 'inspection-order' at all times. He wants the farming sections up to the best industry standards, and he wants a good rate of physical achievement from his establishment. With a reasonable number of faculty members and support staff, and the considerable student labour force, it can be done. But if the first goal of the college - the education and training of students - has been displaced by the desire for orderly and successful farming, then the appearances are deceptive, for the college is a failure. The two things, good educational practice and a good level of physical achievement are not incompatible. But I suspect that where the learners are fully involved there will always be a certain amount of disorder and confusion. This is acceptable if the cause is the learner's inexperience and if he is able to correct it, or to call for assistance if he cannot.

The Problem of Student Involvement

The purpose of practical work is to familiarize the future agriculturist with the skills and techniques of farming, so that the theoretical bases become meaningful and the limitations of translating theoretical formulae into action are appreciated. Indeed, the relevance of practical work in agricultural colleges is so obvious and its practice so widespread, that its failure - and the causes of its failure - may not be understood. Dewey said "We never educate directly, but indirectly by means of the environment". (1) But the establishment of the enriched environment that should surround an agricultural college is only the beginning. "Setting up the conditions which stimulate certain visible and tangible ways of acting is the first step. Making the individual a sharer or partner in the associated activity so that he feels its success as his success, its failure as his failure, is the completing step". (2)

The failure of the tightly scheduled practical work programme is that the students are not involved in any project beyond the few hours of work they actually do. And if even these few hours are done out of a sense of 'duty' (or perhaps only because to neglect them would incur penalties) then the practical work is sterile. With a large establishment and many kinds of farming experience to be acquired, the problem is to organize the exercises so that the students feel that they are sharers in it, and are concerned in its ultimate success or failure.

Some Practical Solutions

Some approaches to the problem are described below arising from experience at Vudal Agricultural College and the Popondetta Agricultural Training Institute (both operated by the Department of Agriculture, Stock and Fisheries in the Territory of Papua and New Guinea).

Certificate Level: The Popondetta Agricultural Training Institute gives agricultural training at certificate level (sub-diploma). It is a two-year course and intake level is usually Form 3 (i.e. after three years of high school). The Institute caters for 120 students. The course is divided evenly between classroom work and practical exercises. The aim is to produce intelligent agricultural practitioners. Many of the graduates are employed in the Public Service as Project Managers, or in supervising operations of cooperative societies, etc., and in some cases, even take full responsibility for agricultural extension at the sub-district level.

The Institute has 600 acres of farmland, and a good range of cropping and livestock activities has been established. The number of labourers employed is relatively small. Nor is there much mechanisation. With a 100-inch average annual rainfall a lot of maintenance work, especially weeding, is necessary. The students, who would have started school at about six years of age and attended for nine or ten years, are young and unpractised in manual labour. Yet the bulk of work at the Institute falls to them.

It is a situation in which staff-allocated and supervised practical work for up to four hours a day, in addition to lectures and other assignments, could easily destroy whatever interest and enthusiasm students had for agriculture. In fact, a few years ago the Institute faced this very problem. Unauthorized absences, poor performance of duties and even open resentment of certain tasks were increasingly evident. But from its beginning, the Institute had established open and regular consultation between students and staff. No subject was considered exempt so long as the students were prepared to suggest constructive alternatives and to carry these through once accepted. Aspects of practical work had been discussed often enough, but now the staff urged the students to take up the whole subject and to say how they wanted it organized. This they failed to decide.

The lecturer in charge of crops then made a proposal to the Principal that his sector be reorganized. He normally had half the student body for a month at a time. During this period, the students were assigned daily to different crop areas, nurseries or processing tasks, and worked under the direction of a staff member. The proposal was that three senior students take charge of the crops' work each week. They would go over the whole area on Friday afternoon and draw up a list of what had to be done in the next week. They would then decide what labour (students and employees) they could allocate to it, as well as deciding the use to be made of the tractors and implements, and they could requisition the Institute motor truck if they saw a use for it. With their priorities decided, they would explain their decisions to their fellow students allocated to the section, and supervise them on the tasks.

At the end of the week another three students would take over the supervisory task. On Friday afternoon, the incoming supervisors would accompany the outgoing ones on a tour of the farm crops. They would be accompanied by the lecturer, who would remain out of the discussions as much as possible, but would be present for consultation and could intervene if a major oversight was occurring. The outgoing supervisors would explain what they had aimed to do, what they had failed to finish (and why) and what they thought should be done next. The incoming group would make their plans for the next week, and take over.

The remarkable thing for the Principal was the opposition that the proposal aroused among the students. Apparently they felt that the staff were abandoning their responsibilities and loading them on to the students. They evidently felt exposed and insecure, and for over a month the proposal was deadlocked.

Perhaps there was a way in which the plan could have been introduced without by-passing the democratic process. But the then Principal did not know of it.** Being impatient he used his authority, and the change was imposed. The next few weeks saw some confusion. Unexpected contingencies - like an out-of-season rain-storm - threw the students' careful plans into chaos and the whole afternoon would be 'lost' while they decided what they should do next. The lecturer in charge kept out of the student discussions, and was both tolerant and supportive of their efforts. As their confidence grew, and as the student body got the feel of the new arrangements, a new spirit came over the practical work.

Among the advantages of the new scheme were that the students were now learning to plan and programme as well as to manage labour and control machinery usage. The less pleasant tasks were seen as necessary by them, and the drudgery goes out of weeding and digging if the success of the project belongs to the weeders and diggers. Moreover, the formation of 'good' attitudes and the changing of 'bad' ones is a central task of education. Katz has said "In any practical attempt to change attitudes, social support and group influence assume first importance". (3) Here we

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** The author was Principal at the time.

had a group of peers interacting and supporting each other, and joining a 'reference group' of dedicated agricultural workers. Students who cannot or do not want to join in the rather vigorous life of the Institute usually drop out from the course in the first year - the percentage is low. Almost all of those reaching second year graduate and their record in the field is remarkably good.

Diploma Level: Vudal Agricultural College poses different problems. It is at a much higher theoretical level and requires Form IV entry standard with upper passes in English, Mathematics and Science. The course is over three years and the aim is to produce graduates who can organize and direct field activities, carry out extension programmes, or work as experimentalists. The College has a wide range of crops and livestock. However, a fairly large labour force is employed, and considerable machinery is available. On the other hand, the 180 students spend more (75%) of their formally organized time in classroom and laboratory work.

In this situation, it has been necessary to rotate students from task to task more rapidly to give them familiarity with the many crops and livestock husbandry systems. As each student has only one day a week on such exercises, it is not possible for him to share in it in the way that Popondetta Institute students share in their projects. However, some important considerations are involved in the organizing of this work. It is stressed to the students that they need to know something of the labour-input side of farming - from the practical as well as the theoretical side. They are aware that the staff consider student time valuable, and they are not used extensively on repetitive tasks - but they are expected to work hard when they are allocated to them. Paid labour is used where there is little advantage for students themselves from the task. However, major activities of the farming year are left to the students to perform. Formal demonstrations are given before the students attempt more complex tasks - for example, nursery techniques, or the pruning of trees or harvesting, and some operations, such as castration of animals or slaughtering are taught by lecture discussion followed by practical demonstration and then student practice. The College timetable is never so rigid that it cannot be dropped for a farm emergency - such as a cow having calving difficulties - and a group of students may attend and assist in the remedial action. The use of small class units (of about 20 students) facilitates such flexibility.

Student Projects

At every stage of the course, Vudal students have individual projects. In the final year they undertake a piece of field research as their final project. Each student chooses his own study. Some of the best work done has been to take recommendations from the Department or from fertilizer companies and other advisory services and to evaluate them critically.

At the end of the second year, each student outlines his proposed study to a committee of staff members and described the design he will use. Often student plans are too ambitious, but once a reasonable outline has been achieved, the student is able to proceed. The committee may withhold approval for the student to go ahead until he has stated his aims and procedures clearly. They may assist him with suggestions, or criticise what he proposes to do. But they try not to interfere so much that the student is deprived of the feeling that the project is his own.

What is required is a study which will involve the student in problems of measurement and control in agriculture. The aim is to develop the student's awareness of the inter-relatedness of organisms and environment, his powers of observation, and his initiative and self-reliance in meeting problems.

Once the student's project and experimental design have been approved, he is able to start work. The laying out of the trial and all recordings and measurements are done by the student. He has a staff supervisor to whom he can refer when necessary, and he has access - through a 'requisition form' - to the resources of the College - machinery, labour, tools, building materials, laboratory facilities, chemicals, etc., and special materials or equipment will be purchased for him if required. An estimate of all of this is required from the student before his project is approved, and for obvious reasons the costs of each project have to be kept reasonably small.

Assessment is continuous throughout the project, but at the end of the year the student presents his results in a written paper, and also describes his project and discusses related published research at a seminar attended by staff and students working in similar fields.

Many examples of worthwhile projects can be cited. The best are original, illustrate a questioning approach and show that the student can try out his ideas and isolate important factors. Because the project is the student's own, motivation is usually high. Students often spend long hours in the field, the laboratory and the library working on their projects. They like discussing them with college staff and acquaintances. Almost every student conducting field trials of any sort erects signs to announce what he is doing and to identify the replications and treatments.

Other Practical Work

Outside field trips and working vacations are also used by both Vudal College and the Popondetta Institute to enrich student experience.

Conclusion

The purpose of this discussion has been to elaborate on an educational problem involved in allocating practical work in agricultural colleges. The core of the argument is that the students must become personally involved in the projects to gain maximum benefit from them. This is possible through a number of approaches. But even where the student cannot be closely associated with a project over a long period, but spends only a few hours on it, if he sees this as an appropriate learning exercise for himself, he will accept it and profit from it. If he sees it as irrelevant or a waste of time, its value is probably negative.

References:

(1) Dewey, J., Democracy and Education (1916) Free Press, Toronto, 1966, p.19.

(2) ibid. p. 14.

(3) Katz "Functional Approach to the Study of Attitudes" Public Opinion Quarterly, Vol. 24, 1960, p.195.

THE RELATION OF A SCHOOL OF AGRICULTURE TO THE UNIVERSITY

by Enrique Enseñat

Although this paper has a specific case in mind, it touches upon a problem of sufficiently wide interest to other countries that may be considering the development of academic institutions for advanced agricultural science. This is the question of whether a school of agriculture should be detached from a university located in one of the larger cities.

Since its first graduation ceremony in 1963, the Facultad de Agronomía of the Universidad de Panamá has awarded a total of 73 bachelors' degrees in agriculture. Total registration for the first semester of 1970/71 was 125 students. The teaching staff consists of 13 full-time and 11 part-time lecturers. The group also includes 2 full-time researchers, 4 assistants holding university degrees, and 11 research assistants. Among them, they cover the agricultural subjects in the curriculum. The basic sciences and other courses not exclusively related to agriculture are given by other faculties. Thus, for courses in mathematics, chemistry, English and so forth, the school has the services of 15 teachers from the faculties of science, engineering and the humanities.

1. Academic Considerations

(a) Problem of the Teaching Staff

At present, 10 out of the 11 part-time teachers giving agricultural courses, and all the full-time teachers, reside in the capital city. New curricula in prospect will require more of both categories of teacher and this will create a real problem since there is no guarantee whatever that a school of agriculture located in the interior of the country will be able to obtain the services of a teaching corps of the same calibre.

Dr. José Emilio Araujo, Director-General of the Inter-American Institute of Agricultural Sciences of the Organization of American States, has pointed out how difficult it is to recruit and obtain professors with good academic backgrounds in a rural location. At Turrialba, Costa Rica, for instance, the average incumbency of the staff over a period of 25 years was 3 years. Additionally, Dr. Araujo draws attention to the fact that, when an organization contracts for the services of a professor, in practice this involves not him alone, but his entire family. Some professors have children of primary school, secondary school or university age. The families have many important personal ties in the cities and some professors have a wide range of interests and connections with the university and in city circles.

These ideas are fully shared by Dr. Antonio M. Arce, a rural sociologist of great prestige in Latin America, who is emphatic that the recruitment of professors cannot be considered in a socio-cultural vacuum. To do so would have disastrous consequences for a school far removed from any urban centre and where teachers have no association with the general university environment. Indeed, the salary a professor will accept for an established position on a main university campus may not be sufficient to induce him to work permanently in a small town which lacks equivalent academic teaching facilities.

This leaves two alternatives: the first is to attract foreign teachers by offering high salaries; the second is to utilize the services of teachers in neighbouring rural secondary schools. The first measure does not provide the continuity essential for efficient university teaching and the first thing that suffers is the research work. Moreover, the teaching itself becomes a victim of improvisation. What finally happens is that one seems to be sponsoring a travel bureau rather than an educational institution.

The second alternative is even more disastrous, because it is impossible to give even the semblance of seriousness that one achieves through the first solution. For, by recruiting really talented professors for short periods, it is at least possible to maintain high standards over short periods of time and thereby cover up the fundamental deficiencies in instruction.

From all this, one may conclude that the organization of agricultural faculties outside the major university complexes inevitably results in the lowering of the academic level.

(b) Schools for Individual Ecological Zones

One argument in favour of the transfer of a school of agriculture to the interior of a country is that such a school should be located in a farming area. This argument has two fundamental fallacies. First, university studies are not intended for the training of farm labour foremen, but rather farm managers or independent well-trained farmers with a sound scientific background. The choice must be made as to which to give priority - scientific study or practical work; the first being proper for higher university-level education, the second for vocational training. Naturally, the best solution is the one which provides students with a foundation of sound scientific training and then enables them, through practical work and laboratory work, to become acquainted with agricultural technology in all the various disciplines in the curriculum. For this purpose, it is not necessary to locate the schools of agriculture in the rural areas.

The other fallacy in the "rural area location" argument is that it is impossible to choose any single ecological area as representative of an entire country. If the school fits into the ecological conditions of one specific area, will this be the same ecological reality for the other parts of the country the school is expected to serve? Naturally, it is not possible for any one location to typify the various ecological zones of a country, because this would necessitate having as many schools as there are ecological zones. This would be economically impractical.

At this point, the following questions arise: what set of priorities should be applied? Should decisions be based on agricultural production statistics? Should the priority zones selected be those with the highest agricultural production potentiality in the coming years? Or, is it considered most important to guarantee to the maximum extent possible that higher agricultural education will be of the most advanced academic and professional level, over and above every other consideration? This last criterion is undoubtedly the best and the one most in line with national interests.

(c) Links with the Scientific World

In determining the location of the school of agriculture, account should be taken of the facilities for international communication in order to obtain the benefit of relations with the scientific world generally. Thus, it should be really convenient for visiting professors to collaborate in the research and teaching, from time to time.

(d) The University Environment

Under discussion here is the education given by a faculty or school of agriculture of the advanced type, which must maintain its professional university prestige. However, the curriculum of such a school is not the only channel of transmission of university culture to professionals in every field. In addition to specific career-oriented courses, the university is a place where future professionals are nourished with the rudiments of culture and the humanities so that professionals following relatively limited courses of study become aware of their obligations in the sociological fields. Isolation of such a school in an area far from a university centre does not permit this process to take place.

From a more practical standpoint, one should stress the existence on the university campus of many educational facilities that are not related to any specific course of study and yet enhance the technical training of professionals. Here one thinks particularly of the central library, the various specialized laboratories, such as those for analytical chemistry, engineering and medicine, electronic computer equipment and so forth.

2. Economic Considerations

Without going into detail here, it is possible to establish that the duplication of essential services necessitated by the removal of a faculty of agriculture from the main university campus is considerable. One calculation in Panama has shown that expenditure on buildings and equipment, and operational costs such as the salaries of professors, will be doubled.

3. Extension of the Influence of a School of Agriculture to the Countryside

It is generally agreed that schools of agriculture should, in some way, extend their influence to the countryside and that such schools should not fail to promote socio-economic development in the rural areas. Divergences of opinion arise on how to extend the influence of such schools. Is it only by transferring teaching staff to rural areas that this can be achieved? Or is it to extend to rural areas the possibility of becoming directly involved in the process of technological change in rural development? The answer to the problem seems to lie in research.

The Faculty of Agriculture at Panama University, through its research work conducted exclusively at the Centro de Investigación Agricola de Tocumen, located 12 km. from the main university campus, produces improved maize seed of the variety 'Tocumen 70', intended for use by small farmers. It is an open-pollinization variety with a potential yield of 60 quintals per hectare. In August 1970, enough of this seed for 450 hectares was made available to rural settlements which, thus, had an opportunity to earn 135,000 balboas. An even more significant step was the seed multiplication project of the Ministerio de Agricultura y Ganadería (Ministry of Agriculture) for the production of 4,000 quintals of this seed for distribution to farmers for the April 1971 sowing. The quantity of seed suffices for sowing an area of 12,000 hectares with a potential yield of 720,000 quintals. At the official support price, this crop will have a market value of 3,600,000 balboas.

Considering that the average crop of Panamanian farmers at present is less than 20 quintals per hectare, it is clear that, without the help of the Faculty of Agriculture, 12,000 hectares would have produced only 240,000 quintals, so that, through one single phase of its research programme, the Faculty of Agriculture had been able to inject into the country's economy over two million balboas in less than a year.

4. In Conclusion

What is true with regard to the location of schools in different ecological zones, holds true for their students. The particular location of a school in a certain place in the country in no way solves the problem of students from other parts of the country. On the contrary, it may happen that matters will be worse for the non-local students; first, because there is no guarantee that there will be living accommodation for a student body that may be expected to rise to 500 in the coming years If this materializes, it will be necessary to provide housing for all students involving radical increases in investment and a large annual budget for the maintenance and servicing of such accommodation.

The only solution to the problem lies in a practical scholarship programme for students from various parts of the country. It has been calculated that, with a stipend of 26,000 balboas per month for ten months of the year, a total of 325 fellowships could be awarded, giving a graduating class of 65 per year. This entire programme would cost less than the outlay which would be required to pay for teachers in the basic sciences alone, if the school were detached from the university campus and located elsewhere.

Having thus established that the best way to enable the school of agriculture to extend its facilities to the countryside and promote agricultural development is through research, it is suggested that the research services be provided with facilities to cover each of the main ecological zones within the school's area of influence.

Such sub-experiment stations may not only be used for research bases by the teaching staff, but can enable graduates from particular parts of the country to do their thesis work in their own regions. This would speed up academic progress and also promote adaptability in relation to field training. Such an arrangement in no way obviates the possibility of providing careers in agricultural sciences in places outside the main university campus. The process of natural growth of a university entails the establishment of regional university centres. When such regional centres offer all the basic sciences at an equivalent level as that offered on the main university campus, a career in agricultural science is opened up to students in every part of the country.

TEACHING AGRICULTURE IN SCHOOLS: AN EXAMPLE FROM MALAWI

By I.S. MacDonald

The following article is based on experience gained during the introduction of agriculture into schools in Malawi, when the author was seconded from the Ministry of Agriculture to the Ministry of Education to assist in the implementation of the programme.

The Need to teach Agriculture in Schools in Developing Countries

There is, in many developing countries, an increasing awareness that all may not be quite right with existing educational programmes. These programmes often tend to be copies of European-type educational programmes and do not necessarily meet the needs of developing countries. Where there are many employment opportunities available in government, commerce and industry, then an academic system may be satisfactory. However, developing countries are normally dependent on the improvement of agriculture for their future progress, and most present educational systems take little cognizance of the need to produce school leavers who want to and can assist towards this progress. Here, one is not talking about training farm labourers, but creating an interest, knowledge and awareness in school children of rural activities and possibilities.

Under present educational systems, children are oriented away from their rural background and towards a largely mythical white-collar future. Parents often make considerable financial sacrifices to enable their children to attend school in the hopes of such a future for them. Yet most school leavers fail to find employment, often after months of searching. The reaction is serious. At the age of fifteen or sixteen these children feel they are drop-outs and have failed. Only after some considerable time do they accept that their future lies in a rural area; and then an agricultural future is grudgingly and unwillingly accepted.

Employment opportunities in developing countries are limited, and probably less than a quarter of the primary and secondary school leavers find employment. Opportunities will increase with expanding industrialization and greater rural purchasing power, but the realization of both of these is usually a long way in the future. Without greatly increased agricultural production, neither of the two goals may be met. In Malawi, for example, there are annually some 24,000 school leavers of Standard VIII and above, the majority of whom must find their future in agriculture. It is, therefore, essential that pupils should leave school with some knowledge of farming and a belief that they can earn a satisfactory livelihood from the land. A change in the pupils' attitude to agriculture and rural life is the most important thing that the teacher can achieve. Education, then, must orientate the children towards their rural environment, and not away from it.

Educators have tended to shy away from teaching agriculture in schools. Rural science is generally permissible providing that it is "educational", and is not too related to local situations and the teaching of techniques. The general view, especially in Europe, is that any needed agricultural teaching should be done post school. But, in a developing country with limited resources, this cannot be done on any scale. It is impossible to provide any sort of agricultural teaching for more than a handful of school leavers. Even if all existing training centres were to be utilised (at the expense of all farmers' courses), only a very small proportion of the school leavers could receive reasonable training. This would still mean that each year the great majority of school leavers are without any training or guidance for their future; and the problem is progressively increasing with the expanding population in developing countries.

In the past in many countries there have been attempts to teach agriculture in schools. This has usually consisted of labouring work in the school garden leading to a dislike of agriculture, little attempt having been made to stimulate the pupils' curiosity or interest - nor has the subject been linked with any other subject. Any teaching attempted was done by teachers who had no textbooks and no training in agriculture.

Agriculture needs to be taught in schools as a subject in its own right and not regarded as an unimportant extra.

The objectives should be:

(a) To show pupils that agriculture can be interesting, scientific and profitable.

(b) To enable pupils to understand and find out for themselves the basic principles of good farming and animal husbandry.

(c) To enable pupils to develop skills needed in modern farming.

A sound agricultural programme in schools will provide other benefits. It will encourage school leavers to understand rural problems and to take a full part in rural development. It will help to accelerate the agricultural development of the country and enable extension workers to teach more advanced techniques rather than be committed full time to teaching basic do's and don'ts.

Agricultural Extension workers should include school advisory work in their overall planning and regard primary schools as part of the overall extension picture, and as having a vital part to play in rural development.

Malawi introduced agriculture as an important subject in all schools and teacher training colleges in 1969.

Teachers

Teachers may not be enthusiastic at having to teach agriculture. Without their whole-hearted cooperation, any programme will fail. Realization of the importance of the programme can be instilled at training courses, and interest in the subject stimulated. The problem of who teaches agriculture was satisfactorily solved in Malawi by making this the responsibility of the biology teacher. This was a good solution as the two subjects should run parallel.

Primary and the early part of secondary school teaching needs can be adequately covered by using biology teachers. However, during the last two years of secondary school, the subject matter is more difficult and a specialist (diplomate) is really required. Such people are in extremely short supply. Malawi has designated twelve secondary schools where agriculture can be taken in the last two years to overcome the problem of lack of diplomates.

Considerable finance is needed to implement and continue the necessary training programme for the teachers. Even with only one teacher for each primary school, the training programme will be a large and complex undertaking. (In Malawi 1,400 schools). The initial training programme can be achieved by utilizing temporarily farm institute staff from the Ministry of Agriculture. They first undergo a "lecturers" course where subject matter and teaching methods are covered. The "lecturers" are then posted to training colleges for the actual teachers' courses. New teachers should receive their training at the teacher training colleges. Short annual refresher courses are essential.

Textbooks and Teachers' Guides

Obviously only syllabuses applicable to the country concerned should be followed. There are usually no suitable textbooks for primary level, and reference books only at secondary level. Lesson-by-lesson guides are needed for each form. These should be planned to fit in with the seasons, and should include suggestions for class activities, using local situations and materials. The guides are best written in 'question and answer' form and the teacher is thus encouraged to elicit information from the pupils and achieve maximum pupil participation. The teachers' guides must be written prior to any training courses or the introduction of the subject in schools.

Supervision and Advice

The programme will work best if the Ministry of Education concerned has overall responsibility for the programme. It is important that agricultural extension workers regularly attend at the schools, to give any technical advice and assistance necessary. Close cooperation between the two Ministries is therefore essential. Headmasters and inspectorate should be fully integrated into the programme as their interest and enthusiasm will do much to make the programme a success. A seminar during the planning stages of the programme will involve them and bring to light possible problems from their own experience.

Equipment and Costs

Tools and materials may initially need to be supplied. This can be a considerable financial item. After the first year, schools could be expected to provide their needs from garden profits. Supplies of vegetable seed should, perhaps, be issued each year. Some £8 ($20) per school is initially needed for equipment, fertilizer and seed.

By using available facilities and staff for initial training from the Ministries, the costs of the programme can be kept down. However, considerable sums are required, even for basic equipment and accommodation/travelling costs for training. Both OXFAM and UNESCO were most helpful and generous in covering these costs for the Malawi Programme. Costs can be determined by calculating accommodation costs for a one or two-month course, and adding travelling costs.

It is still a little early as yet to evaluate the success of the programme. Nevertheless, it appears to be going well, particularly in the primary schools where the need for agricultural teaching is greatest. There is considerable enthusiasm and in many schools, teachers have successfully involved the parents in the programme. Some of the children have started their own projects at home. Much more can be done to stimulate interest, field days, competitions, etc. The dire predictions of a few stick-in-the-muds have not come to pass. The possibilities are beginning to be realized and more organizations are involved in the programme. Regular school agricultural radio programmes are put on the air. Magazines written for rural families are being circulated to all schools. Extension workers in the fields of animal husbandry, health and nutrition are realizing that time spent at primary schools can greatly assist in the implementation of their programmes. The programme may just be one of the most forward steps Malawi has made in its progress towards prosperity and development.

TRAINING ON CEREALS BREEDING AND IMPROVEMENT IN THE NEAR EAST REGION - A COOPERATIVE EFFORT

By Abdul Hafiz

The Near East and Mediterranean countries were self-sufficient in cereals until the early fifties, but the situation changed with the upsurge in population, static crop yields and mounting pressure on land and water resources. As a result, the volume of food imports increased to 12 million tons from 1.2 million tons during the decade 1957 to 1967. This adversely affected the economic condition of many countries.

Cereals are far more important than all other crops in the Region and are a main source of food. They occupy about 70 percent of the total cropped area and represent 43 percent of the total value of agricultural produce.

In 1952 the Food and Agriculture Organization started coordinated programmes on wheat and barley improvement and production, through the Wheat and Barley Project. The main objective was to help member countries in the improvement of varieties and production techniques in order to promote self-sufficiency, raise nutritional and living standards, save substantial sums of foreign currency being spent on food grain imports, and also diversify agricultural production. Each year a number of wheat and barley varieties were supplied in the form of nurseries to member countries for testing under their local conditions in order to sort out high-yielding, non-lodging and rust resistant varieties. It was soon realized that in order to make a greater impact, it was necessary to establish teams of local research workers who could handle the material properly, carry out applied research on a uniform basis, and plan and implement production programmes. Hence a number of training programmes, seminars and meetings were started.

Training Programmes

FAO/Rockefeller Foundation Training Programme: In 1960 a team of three top scientists - Dr. N.E. Borlaug of CIMMYT, Dr. J. Vallega and Dr. J.B. Harrington visited the Near East countries and recommended the establishment of an annual cooperative training programme to be conducted at the International Maize and Wheat Improvement Centre, Mexico, for a period of 8-9 months. The course was held annually from 1961 until 1964, and every other year until 1970. Fifty five persons from 15 countries of the Near East Region have been trained at the seven courses. It is hoped to continue these training courses for a further five years.

The type of training given is of a very practical nature. The trainees attend the OBREGON RESEARCH STATION (irrigated plains) for a period of about 10 weeks to study artificial rust inoculations, crossing techniques, and recording of observations on F1 to F5 generations of segregating crosses. They then move to CELAYA RESEARCH STATION (2,300 m elevation) to carry out selection and harvesting of breeding material (F1 to F5) and the yield trials. Subsequently the group moves to Mexico City and the trainees do the rest of their training at Chapingo and at Toluca (both at high elevations) where they study questions such as sowing of breeding materials, yield trials of summer nurseries, identification of rust races, testing of breeding material for disease resistance in seedling stage, grain quality testing, statistical analysis of yield trials and designing of experimental

plots. The practical training is combined with lectures on the basic aspects of agronomy, breeding and cereal pathology. During this period the trainees handle a lot of bread wheats, durum wheats and triticales in relation to crossing blocks, segregating generations, advanced generations, screening nurseries and yield trials. They are given thorough training in breeding, as well as in selection, against leaf firing, disease resistance and brown necrosis and in relation to agronomic characters - plant height, tillering, size and fertility of head, shattering maturity, seed colour, grain quality, etc. On their way back, the trainees visit research stations in the U.S.A., Canada and some European countries. This training gives a lot of confidence to the participants who develop personal contacts with the top scientists and return infused with a spirit of dedication derived from the leader of the group Dr. Norman E. Borlaug. So now there is a group of more than 80 well trained persons engaged in wheat improvement and production programmes in their developing countries. They consider themselves as members of "Special Group" whose motto is "to produce food for the hungry". Most are now cooperating with the FAO Wheat and Barley Project, and the programmes of CIMMYT and the Ford Foundation. There is still a shortage of trained persons working in other areas.

FAO/Rockefeller Foundation Training Programme for Higher Studies: The aforementioned training programme helped to produce a good number of young trained persons. It was hoped that the outstanding among them would become leaders in their countries. Accordingly they were given fellowships for higher studies leading to Ph.D. degree in Breeding, Agronomy, Pathology and Entomology. Up to the present seven persons have been sent, in addition to many from countries where Rockefeller and Ford Foundations have special aid programmes. Some have already returned to their countries and are now working actively. It is hoped that this programme will continue until highly qualified cereal scientists are available in all the countries to plan and carry out applied as well as basic research.

FAO Seminars for Plant Breeders trained in Mexico under FAO/Rockefeller Foundation Training Programme: To keep the activities of the Mexico-trained persons in top gear and to acquaint them with latest developments in research and production they are brought together periodically at wheat seminars. So far three seminars have been arranged - at Minoprio - Como, Italy in 1965, at Lyallpur, Pakistan in 1968 and at Ankara, Turkey in 1970. Each seminar included lectures and discussions and visits to inspect breeding material, experimental areas, yield trials, experiments on fertilizers in farmers' fields, as well as special field trips to Research Institutes. Well known specialists were also invited to deliver lectures on important topics. The Mexico-trained persons described their programmes of work, the results achieved and the difficulties they encountered - technical, administrative and even personal. The exchange of ideas provided them with a lot of encouragement and a sense of re-dedication to their work. The participants meet as members of one family, try their little Spanish and also communicate with their "Guru" Dr. Norman E. Borlaug, the prophet and protagonist of high-yielding wheat varieties.

FAO/SIDA Training Programmes: FAO and the Swedish International Development Authority jointly have sponsored two (six-week) Regional Training Centres on Wheat and Barley Breeding and Seed Production - one in 1963 at Cairo, UAR and the other in 1965 at Teheran, Iran. They were attended by about 50 young research workers from the Near East countries. About 40 to 50 lectures followed by discussion focused attention on basic aspects of breeding and controlled seed production with special emphasis on the problems being faced in the Region. Participants also visited a number of experimental stations and studied the experimental techniques. The lectures were printed and distributed not only to participants but also to many other research workers in the Near East Region. Such periodic training centres are very useful in bringing to the attention of research workers new methodology and techniques of breeding and production, as well as developing, much valued, personal contacts leading, for example, to the exchange of plant material and literature. The regional training centres are likely to continue with the help of SIDA. It has already been agreed that there should be a six-months training course on the improvement and production of maize, sorghum and millets in India, starting 1 June 1971, at which approximately 30 plant scientists from Near East and African Regions are expected to participate.

FAO/SIDA Course in Plant Genetics and Plant Breeding: A training course lasting seven months is held every second or third year for plant scientists from developing countries at the Swedish Seed Association, Svalof, Sweden, under the leadership of Dr. G. Jålén. This course concentrates on theoretical training in principles of genetics and breeding as well as active engagement in practical research projects. Forty two plant scientists from the Near east, Africa and Latin America have benefited from four courses held between 1960 and 1970. This helps the trainees to brush up their knowledge of advanced genetics, to acquaint them with the latest equipment and methodology and to develop personal contacts with eminent scientists for future consultation and guidance. Some participants received post graduate scholarships.

In addition SIDA has also aided the Near East Region by granting special Fellowships for practical training in specific fields such as cereal rusts, grain technology and controlled seed production. Similar fellowships have been granted by the Government of Federal Germany for training in cereal rusts and grain technology at various German Institutes. Short-term fellowships are also arranged between member countries of the Near East Region. Mention should also be made of a Training Course on Seed Production and Certification jointly sponsored by FAO and the Government of Romania over a period of six weeks in 1966, for 20 participants from 23 developing countries.

National Training Programmes: Member Governments of the FAO Near East Wheat and Barley Project have been encouraged to hold annual or biannual in-service training centres for research workers engaged in wheat and barley improvement and production programmes. This became possible with the active participation of Mexico-trained persons. Such training centres have now been included in annual programmes of work and also provide a forum for the discussion of experimental results and the formulation of future programmes.

The cereals breeders/agronomists have also started laying out of demonstration plots with proven high-yielding varieties in farmers' fields for extensive testing. Previously such plots were laid out by the extension service with misleading results because of their ignorance about the actual requirements of the new varieties. This facilitated identification of the best varieties in a short period and also helped the extension service to learn about them. The extension service was then made responsible for carrying out semi-commercial and commercial trials in association with the cereals breeders, giving a real impetus for the quick spread of high-yielding varieties amongst the farmers with an unprecedented speed (Table 1).

DIFFUSION OF HIGH YIELDING VARIETIES

(acres)

Country	Total Area of Wheat	High Yielding Varieties			
	1968/69	1965/66	1966/67	1967/68	1968/69
India	39,432,000	7,400	1,278,000	7,269,000	10,000,000
Turkey	20,015,000	-	1,500	420,000	1,780,000
Pakistan	14,977,000	12,000	250,000	2,365,000	6,020,000
Afghanistan	5,500,000	-	4,500	65,000	300,000

Not only cereal breeders but also agronomists, soil scientists and companies dealing with fertilizers started well planned experimental and demonstration trials to find out the optimum cultural and fertilizer requirements of the new high-yielding varieties, in order to exploit their real potential. The farmers cooperated fully with them. National training and demonstrational programmes have proved very beneficial.

FAO/Near East Wheat and Barley Committee Meetings: This committee, as noted above, was established in 1952 to help member countries (now numbering 20) in the improvement of varieties and production techniques through coordinated programmes. It met periodically to discuss current programmes of work, report on progress, to exchange information and breeding material and to make arrangements for cooperative investigations and other forms of international action which would contribute to the progress of breeding in the region. So far, the committee has held nine meetings, each in a different member country. The tenth meeting will be held in 1972. This committee is also attended by the administrators who are thus acquainted with the type of bottlenecks - financial, administrative or technical - hindering the pace of progress. The committee makes recommendations addressed both to member Governments and FAO designed to effect improvements in the various programmes. The meetings of this committee have proved very useful in keeping the programmes active, effective and remunerative.

Philosophy behind the Training Programmes

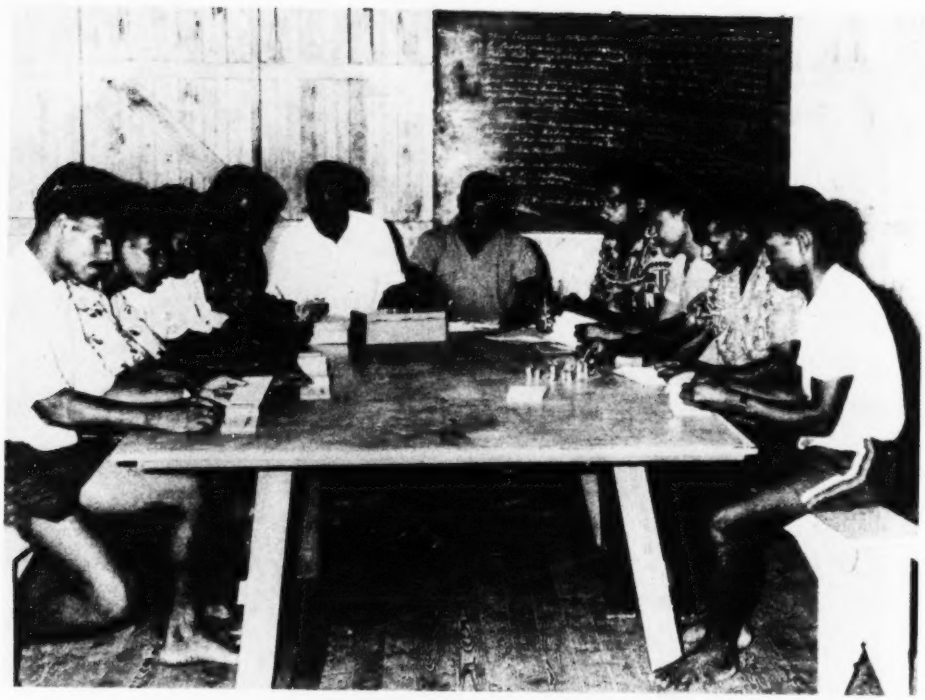
Until recently the shortage of well qualified and trained research workers in various disciplines, including cereal breeding, was acute in most developing countries. It was, therefore, essential to create teams of cereal breeders, pathologists, agronomists and seed production specialists in each country to work on various aspects of wheat improvement and production. To produce highly qualified persons in a short period was not possible in many countries. Hence a start was made in 1961 to give practical training to the available young and energetic research woekers from different countries through the FAO/Rockefeller Foundation Training Programmes and engage them on wheat improvement and production on their return to their countries. This slowly and gradually led to develop a special group of more than 80 trained persons, of which at least 75 continue to be engaged in this work and to follow with pride what is happening through the "green revolution" in some countries of the region. The training programme has created a feeling of comradeship among the trainees resulting in regional and international cooperation to produce food for the hungry. These persons take pride in sharing the success which has been achieved. Other training programmes, seminars, meetings, fellowships, scholarships, study tours, etc., are arranged in such a way so as to maintain a steady follow-up and fill existing gaps in the personnel required. Efforts are made every year to increase the number of the qualified and trained persons to meet the growing requirements as programmes expand. Thus, through these programmes a nucleus of trained persons has been built up, but this is not enough. Large numbers of persons are needed to take up work on the continually expanding activities of wheat and barley crops, as well as those relating to other cereals like rice, maize, sorghum and millets. In due course, similar training facilities will also be provided to the persons working on other basic food crops such as grain legumes, oilseeds, etc.

A typical student farm

(See Article on page 16)

Second-year students selling produce in the market of a neighbouring town

(See Article on page 16)



The Student Farmer Cooperative Committee checks the Society's finances

(See Article on page 16)

A fourth-year project farm

(See Article on page 16)

Third-year student examines insect damage
in his coffee project, Papua

(See Article on page 24)

Third-year students at a fencing
demonstration in Papua

(See Article on page 24)

Third-year student sorting ginger rhizomes in Papua

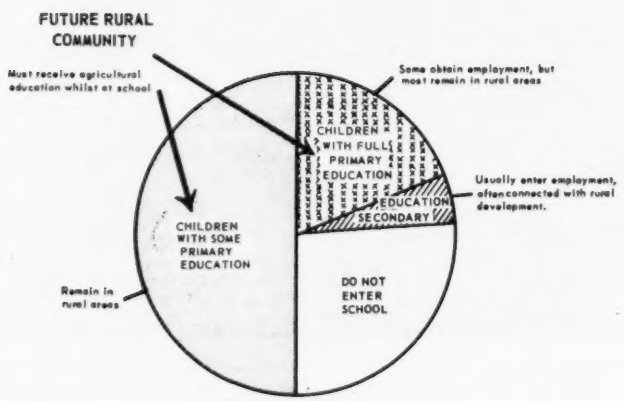
(See Article on page 24)

A school discussion on citrus in Malawi

(See article on page 33)

AGRICULTURAL EDUCATION IN SCHOOLS

IN DEVELOPING COUNTRIES. (Shown diagramatically).

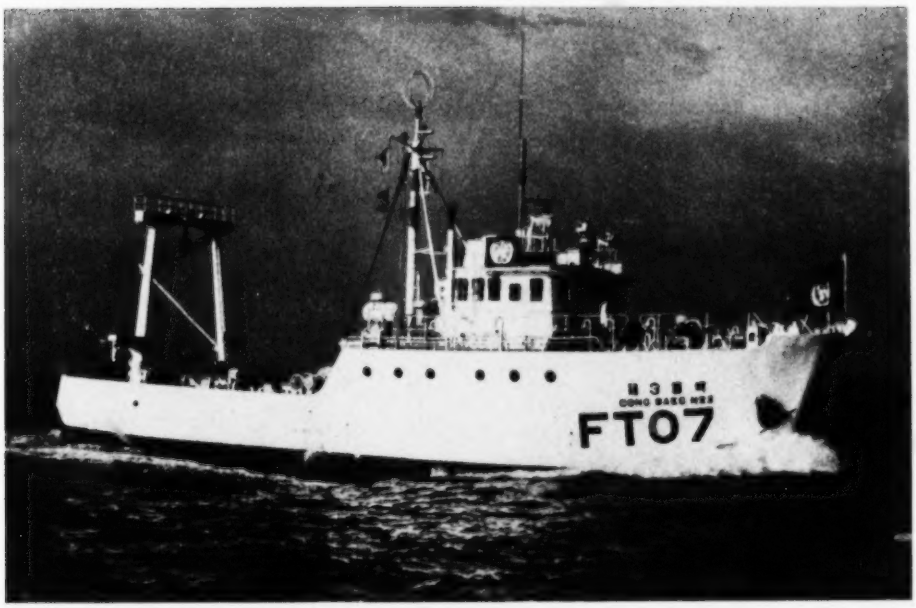

FUTURE RURAL COMMUNITY
Must receive agricultural education whilst at school
Some obtain employment, but most remain in rural areas
CHILDREN WITH FULL PRIMARY EDUCATION
Usually enter employment, often connected with rural development.
EDUCATION SECONDARY
CHILDREN WITH SOME PRIMARY EDUCATION
Remain in rural areas
DO NOT ENTER SCHOOL

Dr. I. Narvaez of the Ford Foundation explaining the new high-yielding wheat varieties to participants at a FAO/Rockefeller Foundation Wheat Seminar

(See Article on page 36)

Dr. S.A. Qureshi of the Lyallpur Agricultural Research Institute, West Pakistan, showing breeding material to wheat breeders from Iran, Sudan, Iraq and Turkey

(See Article on page 36)



Training Vessel "Dong Baeg No.3" UNDP/FAO Coastal Fishing Training Centre, Pusan, Korea

(See Article on page 40)

IDEC Participants at an animal health demonstration in Denmark (Photo: S.A. Andersen)

(See Article on page 44)

Female locust showing abdomen extended for egg-laying.
Eggs are deposited through the tip (FAO photo by G. Tortoli)

(See Article on page 56)

French Morocco 1954 - A swarm of desert locusts
(FAO photo by Jean Manuel)

(See Article on page 56)

PROBLEMS IN FISHERY EDUCATION AND TRAINING

by Y. Miyake

I. Traditional Pattern

Fishing has long been considered as an occupation which could be learned on the job. It is basically a hunting operation and in early days involved only simple fishing gear and boats. Skills were handed down from father to son.

As technology developed and boats became larger and mechanized, particularly in marine fishing, it became necessary to teach fishermen navigation, but finding and catching fish was still left to on-the-job training. This was partly because finding and catching fish depended greatly on the experience and intuition of fishermen. This traditional pattern of training still persists in many parts of the world and in many fishermen's schools Navigation is still the main subject.

II. Recent Trends - New Approaches

The situation is, however, now changing due to rapid technological developments. Traditional patterns of training cannot meet the need arising from increased capitalization and highly complex equipment. Many new techniques and fishing vessels have been developed for which on-the-job training is not adequate. At the same time, so-called "scientific" fishing, as a result of advanced technology, makes it necessary to teach skills in an institution, as it is wasteful to use very costly boats for skippers to learn by their mistakes. The stage has now been reached where fishing techniques can be and are being taught systematically by means of a suitable mixture of learning on-the-job and organized teaching in institutions using simulators, textbooks and other teaching aids.

This new approach has been introduced and developed by certain countries, notably by Japan and the U.S.S.R. In Japan there are two fisheries colleges and about fifty fisheries high schools where about 10,000 fishery personnel are being trained on shore as well as on board training vessels. In the U.S.S.R. the Fisheries University of Kaliningrad has 8,000 to 9,000 students being trained in mechanical engineering and nautical and fishery subjects. It is apparent that rapid fishery development in these countries has been made possible only by such an education and training system.

III. General Problems

The traditional pattern of education and training still prevails in most countries although the need for the new approach is now being recognized.

(a) Lack of education policy and planning

In order to establish a fishery education system there is a need for clear and firm government policy regarding fishery development and training. This enables governments to establish training requirements and draw up training programmes. The fishing industry in most countries is at present a small part of the national

economy, and this is often reflected in an inadequate fishery administration. Responsibilities for the industry as well as for training are often divided and unclear, which makes an integrated and coordinated approach impossible. Close attention should be paid to this basic problem, which must be solved before any real progress is possible in relation to fishery education and training.

(b) Lack of institutions with adequate curricula

In 1969 the FAO Department of Fisheries circulated a questionnaire to member countries to find out where fisheries training institutions existed for the primary sector, what their curricula were, and also which institutions were in a position to accept foreign students. It was possible to record the existence of only 136 institutions in 48 countries. Even though the information may not be complete, it clearly indicates that the training facilities existing in the world are far short of the number actually required. The shortage is particularly acute in developing countries. The survey also made it evident that many of the existing institutions lacked proper training equipment - particularly training vessels - and that many could offer only short courses limited to navigation.

(c) Lack of textbooks and manuals

As far as training in the finding and catching of fish are concerned, textbooks and manuals are very few, except in countries such as Japan and the U.S.S.R. where systematic training has taken place.

Textbooks on certain subjects - such as trawling or purse-seining in general - can be used anywhere in the world, but many subjects are local and therefore special textbooks and manuals are needed for specific regions or countries. Textbooks and manuals are lacking for each of the various levels including higher-level technological training, training of skippers, mates and engineers, as well as training of fishermen by extension workers.

(d) Scarcity of Instructors

To ensure competent instructors is always the key point in effective education and training. Former skippers, mates, engineers, or those who have studied or had experience in fisheries, can often become teaching staff on fishery subjects. However, in order to ensure a full impact, the teacher needs more than a knowledge of the subject matter. He must have a knowledge of teaching methods, teaching aids, handling of students, etc. In the majority of fisheries training institutions very few instructors have received formal training on these subjects and there are practically no institutions specialized in the training of fishery instructors. In a few countries, some fisheries training institutions or general teachers' colleges offer courses on pedagogy and teaching methods for prospective instructors. These facilities, however, are very limited and it is always difficult to find institutions suitable for training fishery instructors.

IV. Special Problems

There are several problems which arise from the special nature of the fishing industry:

(a) Artisanal Fishermen

While fishing operations are progressively being mechanized and industrialized, most fishing operations are still carried out by artisanal fishermen. They represent

a very low level of fishery technology and operations are largely of a subsistence nature. The general level of education of the fishermen is very low and often they are illiterate. It has been estimated that there are 8 million of these fishermen, or 80 percent of the total estimated number in the world. Training them to introduce improved techniques and to raise their living standards is therefore of the first importance.

Formal training, however, is not appropriate for artisanal fishermen. What are needed are extension services to provide informal tuition to fishermen. Unlike agriculture - for which extension services have been established in a great many countries of the world - fisheries have very few facilities of this kind.

(b) Recruitment Problem

By its very nature fishing is an arduous occupation and is hazardous, physically as well as economically. Rates of remuneration are often lower than that of other sectors of industry, particularly when the conditions of work are taken into account. Fishing operations are usually carried out in remote environments and in many countries the industry has a very poor image and enjoys little prestige. Little wonder therefore, that, with the increase of employment opportunities on shore in other sectors of industry, the younger generation, including the sons of fishermen, are less and less attracted to the fishing vocation.

Although the recruitment problem is felt more strongly in the industrialized countries where there are many alternative employment opportunities, developing countries are also beginning to face the same problem. The solution lies in the improvement of the fishing industry's image through better working conditions, higher remuneration, social benefits, etc. However, this will not be possible unless the fishing industry can compete economically with other sectors of industry. Higher standards of education and training will help to justify better employment conditions and help to improve the industry's image. In all these matters it is again stressed that in most countries clearer government policy on fishery development represented by an adequate fishery administration is a prerequisite for fostering the industry in relation to recruitment and all its other aspects.

(c) Problem of Conversion and Re-training

Due to the nature of the occupation, it is natural that fishermen, after a number of years of work, may desire to leave the fishing activity and seek work on shore - which may or may not be related to fisheries. In other words, there should be a possibility of "short careers" in the fishing industry. This prospect would considerably ease recruitment problems. Unfortunately, fishermen often find difficulty in moving to another occupation because of their limited level of general education. Training curricula, therefore, should be revised and upgraded to provide a better basis for a change of job. Higher levels of general education would also facilitate the implementation of the re-training programmes which give fishermen access to knowledge of new technological developments and of different types of fishing.

(d) International Cooperation

Many developing countries have no fisheries training institutions. It is also true that in certain fields (e.g. training of field officers and extension workers and training of instructors) the number of trainees is small and does not warrant the establishment of training institutions.

In these circumstances, existing institutions, both in developed and developing countries, ought to be open to foreign students as far as possible and utilized to their full capacity. According to the FAO survey referred to above, of the 136 fishery training institutions recorded, two-thirds indicated a willingness to accept foreign students. In fact, some exchange arrangements are already being made and this should be further encouraged by disseminating information on training facilities and by arranging international fellowships.

It should be borne in mind that the most effective training is that carried out in an environment similar to the one prevailing in the student's own country. Accordingly, regional arrangements for the utilization of existing facilities are most desirable.

V. Ad hoc Consultation on Fishery Education and Training, 1972

It is against the background described that FAO plans to organize an ad hoc consultation of experts on fishery education and training in 1972 (provisionally scheduled for November in Rome). Problems regarding the planning and execution of fishery education and training programmes will be discussed and, in particular, an appraisal will be made of existing programmes and facilities with a view to identifying measures to be taken at the national, regional and international levels to establish or improve education and training facilities.

TRAINING FOR DAIRY TEACHERS

by A.W. Marsden

Introduction

The idea of discussion groups as a means of imparting knowledge is by no means new. It has been applied in many countries for a wide variety of topics and has generally been successful. It does, however, demand of both the organizer and the participants more effort than is normally the case with the formal teaching system in education or training programmes. The teacher/pupil relationship is more dependent on a fuller understanding of the aims of the course, and demands very careful planning months ahead, especially when the participants vary in social background and educational level.

The plan to have an International Dairy Education Centre in order to bring together dairy experts, dairy teachers, research workers and extension officers from developing countries was first thought of about eight years ago. It was envisaged as a seminar-like meeting which would be held for a period of about one month during the summer recess from schools, colleges and universities in the northern hemisphere. Such a centre would provide a forum for professors, teachers, extension officers, personnel officers and others in the developing countries who were actively connected with the preparation of dairy training programmes, to meet for discussions on dairy training techniques and receive information on the latest developments in milk production and the dairy industry.

The matter was discussed at the first FAO International Meeting on Dairy Education in Paris in June 1964 and at the FAO Expert Panel on Dairy Education in 1967. It was urged that a centre should be formed as soon as possible. Because of its support for dairy training in developing countries over a number of years, the Government of Denmark was approached on this matter and undertook to provide funds and facilities for an International Dairy Education Centre, to be held for a month each year in Denmark. The first Centre (IDEC-1968) was held at Aarhus in Denmark during July-August 1968. Some 24 participants from developing countries were selected by FAO, each being a teacher of dairy science, technology or husbandry, or concerned with extension work in some aspect of the dairying sphere. IDEC has been held annually in Denmark since 1968.

Purpose

The purpose of the Centre is as follows.

1. To learn something of the new techniques of teaching and of transmitting ideas, particularly as applied to training in developing countries.

2. To become conversant with the problems of dairy education and training in different developing countries and the ways in which these may be tackled.

3. To study the factors leading to the successful establishment of dairy training programmes in developing countries.

4. To exchange ideas and experiences with colleagues and others involved in the dairy industry from countries with different levels of dairy education.

5. To inform participants about the latest techniques in producing and processing milk and in manufacturing and distributing milk products, together with the dairy equipment involved, and to enable them to see for themselves some of these processes and products.

The programme for IDEC varies somewhat from year to year but consists essentially of two parts, namely about one-third on modern teaching techniques and audio-visual aids and the remaining two-thirds approximately equally divided between subjects concerning milk production and the dairy industry.

Participants

At a meeting in Rome early in 1968 it was agreed that selection of the participants should be made jointly by FAO and the Danish Government on the basis of recommendations from FAO and Danish experts in the developing countries who knew the candidates. This procedure has been followed in each succeeding year.

Three senior participants have been invited to take part in the discussion groups each year. They have been drawn from members of the FAO Expert Panel on Dairy Education, the Directors of the FAO/Danish Regional Dairy Training Centres, and other senior experts with practical experience of dairying in developing countries. The Centre has been directed by a senior dairy scientist from Denmark and the FAO Dairy Education Officer.

Form of the Seminar

IDEC is based on the discussion group system of training. Each subject is introduced by an authority specially selected for the purpose, after which the participants are divided into three groups of 6 - 8 members, to each of which is attached one of the Senior Participants. Each group then retires to its own work-study room where the discussions begin on the subject which has just been introduced. In turn every participant has to act as chairman and later as rapporteur of the group. Discussions continue for two or three periods with interim breaks. It is the responsibility of the Senior Participant to see that no one member of his group dominates the discussions and that all members are given an opportunity to make their contribution.

In this connection it is interesting to note that IDEC participants have very different backgrounds, although all may be concerned in some way or another in teaching dairying subjects. During recent years the participants have ranged academically from the dean of a faculty at a large university on the one hand, to an extension worker with little more than a primary school education on the other. Yet despite the difference in their educational backgrounds the groups have all been successful. The shy and less academic man has acquired confidence during IDEC and senior participants have learned to appreciate and understand the special difficulties their colleagues are having to contend with in teaching their subject in developing countries. Both have learned much during their month at IDEC, and it is believed that both have returned to their countries with new ideas and a greater understanding of the problems involved in teaching dairying subjects.

During the course of IDEC, every participant is called upon to give two short lectures of 10-15 minutes, the first on some aspect of the dairy industry in his own country and the second on a technical dairying subject of his own choice. He is shown how to use visual aids and helped in the preparation of teaching material for each lecture. Each participant in turn gives a short lecture before his fellow participants, senior participants and the staff, and afterwards each lecture is constructively criticized. A week later he is called upon to give a second lecture. It is noteworthy that in all cases the second lecture is given in a much more interesting fashion and with a much better standard of delivery than is the case with his first lecture. It is gratifying, therefore, to observe that with a little thought and constructive criticism, almost all teachers can be improved. It is also worth noting that, with very few exceptions, all participants have taken criticism by their fellows very well and have noted their own faults and shortcomings - as evidenced by the superior quality of presentation of their second lectures.

In the fourth week participants present a short written report of their work and impressions whilst at IDEC. The reports are printed and circulated to other participants and at the final session the views, comments, objections, recommendations, etc., are discussed in an open forum. The major comments made by the participants each year appear in official FAO reports of IDEC and a perusal of these will show that much thought has gone into their preparation and many good ideas have resulted.

At the three Centres held in 1968, 1969 and 1970, 54 participants from 23 countries have taken part, one participant being a woman teacher who was Principal of a school in central Africa. The greatest number of participants have come from Kenya (7) and from Chile (5), India (5) and Uganda (5).

Recommendations

During the three Centres held so far, 30 recommendations have been put forward and have appeared in the official reports of IDEC. These have ranged over a large number of topics relating to dairying: some relate to teaching but many refer to the development of dairying and the dairy industry in Asia, Africa and Latin America. Several of these recommendations have already been put into effect and many call upon the developing countries themselves to take initial action to improve dairying practices and training for a career in dairying. It is clear that teachers from developing countries recognize the need for improving their methods and techniques and that these recommendations are, in effect, urging their own countries to take effective action.

Conclusions

IDEC is the realization of a dream which was put into effect in 1968 and has worked very well. It has shown that people from different countries can live, work, play and laugh together when they have a sound common goal - that of learning something new about dairying and how to apply this information in their own countries.

The group discussion method of imparting information has proved very successful. Each participant has to take a positive and active part in the discussions, to present his own views, to comment on the opinions of the others and to give short lectures to other participants. By this means self-confidence is created and caution encouraged about his own utterances. It brings out the reserved person because everyone has in turn to become chairman and rapporteur of his group and to demonstrate his ability to use modern teaching techniques and equipment.

IDEC was started as an experiment. It has proved to be a success and it is hoped it will continue for many years.

AGRICULTURAL EDUCATION AND TRAINING IN THE USSR

By B.J. Sestan

Agriculture in the Soviet Union constitutes a very significant part of the national economy. 224 million hectares are under cultivation employing about 25 per cent of the population. As with other sectors of the Soviet economy, agriculture is also undergoing rapid change, made necessary by the pressing need for more diversified agricultural products of a higher quality for the growing population and for various processing industries.

Development of agriculture is taking place within the specific framework of a socialist economy in which all agricultural production is organized in large units - state farms (sovkhoz) or collective farms (kolkhoz). An average sovkhoz has 41,700 hectares and an average kolkhoz 10,300 hectares and the large size of these production units enables the organization of production along industrial lines, with intensive use of mechanization and specialization of production. The development of power capacities and technical equipment in these units is impressive. In the period 1960-1968 alone, the number of tractors (15 h.p. equivalent) increased from 1.9 million to 3.7 million, trucks from 0.7 million to 1.1 million, etc.

The size and structure of production units in Soviet agriculture calls for a high standard of 'know-how' for technical personnel, not only in technological matters but also in managerial and economic disciplines, and the Soviet Government is paying great attention to preparing technical personnel as part of the general dynamic policy for education and training in the USSR which has characterized recent years.

Data from the 1970 census show that from the total urban population, over ten years of age, 59 per cent have received an 8 or 10-year schooling or higher education, and that the comparable figure for the rural population was 33 per cent. For employed persons, the respective figures are higher: 75 per cent for urban and 50 per cent for rural population.

Such high levels of education derive from several basic features of the educational system - tuition is free and practically all students have scholarships to cover living expenses. Graduates at lower levels have the possibility to enter higher levels and flexible schemes of study exist for those who are employed and who can choose various types of correspondence course.

The whole educational system is very much based on elaborate planning, which includes development of various institutions, sets of targets for the number and specialization of students and even anticipates employment opportunities for graduates.

Agriculture has an important place in the whole system of technical education. It does not suffer the comparatively inferior status typical of many other countries, because the scales of remuneration for all qualified personnel are nearly the same. An agronomist receives a salary similar to that of a medical doctor and other professional personnel.

Higher Agricultural Education

Agricultural education in the USSR is given in 98 institutions of higher learning to 430,000 students (1968) of which 230,000 are of the correspondence type. Higher education is given by specialized institutions ("VUZ" and agricultural academies), which are not incorporated in universities. However, the universities supply biologists, meterorologists and similar specialists who may work in the agricultural field.

Education offered at the higher level is always specialized and the specialization

starts from the first year of studies. At present, there are about 20 specializations in the agriculture field and 15 in related fields. It is interesting to note that recently in some institutions a new specialization, "Mathematics and Cybernetics in Agriculture", has been introduced.

The duration of studies in 52 months for most specializations, with the exception of engineering, veterinary science and mathematics-cybernetics, which last 58 months.

Students have to attend lectures, laboratory and practical work regularly and may be expelled from the institution if they fail to observe the study regulations. Regular and disciplined study is, however, greatly facilitated by the very favourable conditions for students - nearly all of whom have scholarships; there are many hostels and cafeterias, good accommodation, free medical treatment, etc.

Institutions of higher learning in agriculture in the USSR are large and there is a tendency towards larger units. An average institution has about 4,000 students, but there are some larger institutions (like the Agricultural Academy of Kiev) with 5,000 regular and 7,000 correspondence-type students.

There is no lack of candidates for agricultural studies. For each available place, there are three or more candidates.

The staffing situation of the agricultural higher schools is very good. Teacher-student ratio is about 1:9 - 12 so that the students have ample opportunities to consult the senior teaching staff on problems connected with their studies.

Practical training is a very important element in the curricula of students and accounts for about 20 per cent of the total study. During the first two years, "training practice" takes place, usually at the institute's experimental farm and workshop. This consists of practical training in the curriculum subjects, the main goal of this being to consolidate the knowledge acquired during lectures and laboratory and to link the theory with actual farm production.

During the "training practice", students learn to drive tractors, lorries and other machinery and, under existing regulations, every student is requested to pass an examination for a certificate of professional tractor driver, combine-harvester driver, etc. All students must also take an examination for 'amateur driver'. The same applies to all specializations: students following courses in agricultural mechanization take examinations for mechanics, turners, etc.

'Production practice', the second type of practical training for students, is carried out during all years of study; during the first two years, on the training-experimental farms belonging to the educational institutions themselves. During the third or fourth year, this practice is also carried out elsewhere - in experiment stations, on state or collective farms, in large repair shops, etc.

The content of this practical training is comprehensive, developing each year in accordance with the growing knowledge of students. In the first two years, it is concentrated on all operations in the farm, both from the technical and economic points of view. Methods of labour input calculation, and accounting are practised.

In the third year, the practice is concentrated on experimental and research problems - methods of field experimentations, demonstrations, biometrics, etc. Students can start collecting material for their graduation theme and start on its elaboration.

In the fourth year, the practice is oriented to organizational and managerial problems, to the planning and managing of farms, to economic and financial aspects, etc. During this practice, students continue the elaboration of their graduation theme, which is always closely connected with the content of the practice.

Since, in the USSR, there is a planned system for employment and students obtain scholarships from the state budget or directly from state and collective farms, many of them have their practice organized on the farm where they will be employed after graduation. In this way, many students have the advantage of becoming acquainted with their future work, and with the social and cultural characteristics of the people, resulting in the minimum of difficulties in adapting to their subsequent employment and living conditions.

During 'production practice', students are supervised by instructors who visit them twice during the season and are directly assisted by the technical staff of the farm who are encouraged by a bonus equalling 10 to 30 per cent of their basic salaries.

All institutions of higher learning have large and well-equipped experimental and training farms, most of them modern, large units of several thousand hectares, and this facilitates the smooth organization of the practical work.

The state is encouraging the modernization of these farms and has made a special regulation by which they do not have to pay to the Government part of their profits (as is the case with other farms). Thus, they can use the money for the modernization of production, purchase of new machinery and investment in students' laboratories.

Intermediate-Level Education and Training

Intermediate-level education and training in agriculture is expanding considerably in the USSR and there is a growing need for technicians at the diploma level. This type of education is offered in the agricultural technicums, spread all over the country. In the period 1950-1970, their number has increased from 461 to 628 and the total number of students (full-time and correspondence-type) is 640,000.

The structure and pattern of state farms and collective farms calls for large numbers of technicians as heads of working brigades, heads of sectors of production, etc. Since there are no individual farmers in the USSR, there is no extension work in its classical form. Technicians are, however, often engaged in on-the-job training of workers and members of the collective farms, as well as with teaching in the winter courses.

Students enter the technicians' course after a general secondary education (8 or 10 years) and the courses last three and a half years. (For those with ten years' secondary education, courses are one year shorter).

Nearly half the students enrolled in 1970 studied through a correspondence system, which has large diffusion and is one of the important aspects of the education system in the USSR. This type of education lasts one year more than the full-time system, and is well organized with textbooks and manuals supplied and paid leave arrangements (30-40 days yearly) to do laboratory practice and sit examinations.

The training of technicians has a strong practical orientation - about 60 per cent of the time is spent on theory and 40 per cent on practical learning. Much close attention is also paid to general education; these subjects are taught mainly in the first two years: mathematics, for example, has 303 hours and physics 205, so that a considerable grounding in these subjects is given. Technicums are well supplied with various types of programmed learning facilities.

All technicums have their own training farms where part of the practical training of students is organized. The production practice is carried out mostly on well-equipped and organized state or collective farms where there are ample possibilities for acquiring technical and managerial skills.

In the last decade, a new type of intermediate-level educational institution has been built up - the so called "Sovkhoz-technicum". Here, an educational institution is combined with an advanced state farm and training is fully integrated with production. Students take part in all farm operations: they are paid while working on certain jobs and their teachers are responsible for various production sectors.

The Government grants the farms special privileges in relation to the distribution of profits - 40 per cent is used for the development of the farm, 50 per cent for laboratory equipment, cultural needs, etc., and 10 per cent is paid as a bonus to the workers and employees of the farm. There is discussion at present to the effect that some of the most advanced farms (i.e. those having incorporated processing industries, or a specialized production of high quality products) should pay, partly or totally, the salaries of their teaching staff in order to relieve the budget supplied by the Government.

Clearly, the close connection between the theoretical part of the learning process and production, with its many technical and economic elements, results in well-prepared technicians who adapt without many difficulties to their conditions of work.

Finally, to give some idea of the magnitude of agricultural training, it may be mentioned that in Moldavia, one of the smallest Republics of the USSR (2.7 million hectares, of which 1.8 million is under cultivation), there are 14,000 specialists in agriculture, a third of them with higher and two-thirds with intermediate education. The Republic of Uzbekhistan - half a century ago a backward and illiterate region - with 497,000 sq. kms. employs today in agriculture 110,000 specialists of various kinds with higher and intermediate qualifications.

TANZANIA FACES THE CHALLENGE OF SOCIAL CHANGE AS IT TRAINS WOMEN FOR RURAL DEVELOPMENT

By Ludmilla A. Karin and
Jean S. Ritchie

Women, in all the rural areas of the world, have tremendous potential impact on the future social and economic development of their countries. Tanzania is no exception. 1/ A sizeable majority of the adult rural population are women, and currently form the larger proportion of the labour force for agricultural production. The accomplishment of the objectives proclaimed by the 1967 Arusha Declaration, of a better life for all Tanzanians will no doubt be measured in both economic and human terms. 2/ An important dimension of such an evaluation will most likely be rural women's ability to participate in the implementation of national plans for rural development.

Tanzanian women, as mothers, homemakers and community citizens hold the key to human development, for it is in the home and immediate community environment where basic needs for food, clothing, shelter, health, love, security, personality and intellectual development are generally fulfilled. Thus, it follows that success in raising rural levels of living in the nation will be heavily dependent on Tanzanian women's capacity to fulfill their various roles and to make their full contribution to human resource development.

Man's productivity, the quality and intensity of his labour, skills and services depends in great part upon the quality of resources available. Many of these factors are traceable to patterns of family and community life, the home environment, the quality of food provided to the family and the dynamics of family living; all of which contribute to human development. If this general assumption is sound then resource development at the family and community level is essential for full development to occur at the national level. This is well recognized by the Tanzanian Government which, since 1961, has given top priority to raising the standards of rural living.

Tanzania is making great strides in rural family development through home economics training and related field programmes. As in every country, the standard of home and family life varies with the capabilities and motivation of the women homemakers as well as with the economic resources available to families. However, the availability of community resources and adequate rural infrastructure, important to the total process of rural development, are still lacking throughout Tanzania. A new venture in the establishment of new community structures called Ujamaa villages, is an effort to help resolve this problem.

Rural women, up to the present time, have assumed little responsibility in family and community affairs, nor have they possessed skills to do so. The men of the household generally have taken the household decisions and the women's position in the tribe has been an inferior one. Although many new policies have brought legal and political rights to Tanzanian women, few rural women are educated, and thus are not prepared to assume their equal rights. Nor do the majority of men in rural areas yet accept that their wives - for whom they have paid bride price - should be their equal partners. Now, suddenly, rural women are being called upon to join men in building the nation and unfortunately they are not adequately prepared for the task.

The Government is faced with the enormous task of attempting to introduce policies aimed to advance the status of women, and at the same time to educate and train millions of rural women so they can fulfil their social and economic roles. Although this need is recognized, most girls and women still do not have equal access to formal school education. Public funds for buildings and training teachers are still lacking. Furthermore, when family resources are limited, boys are generally given preference over girls.

Continuing high population growth rates of 3.1 percent or higher are a factor with which economic and educational planners will need to cope, as they strive to provide free primary education for all. It will also be important for parents wishing to educate all of their children, boys and girls equally, to take responsible decisions relating to the number of children they procreate.

Education of Women for Family and Economic Roles

Women have a strong potential role in many aspects of economic development, in relation to their family responsibilities as well as their agricultural production activities. The fact that most rural families are basically subsistence farmers and grow the bulk of their own food highlights the need for modern knowledge of nutritional needs and skills in planning and producing the right foods. Rural women play an important role in family economics as well as rural economics.

There is a desperate need for women to learn new farm and home practices and management sills - as highlighted by an evaluation seminar held recently at the Buhare Home Economics Training Centre.3/ It was emphasized by the Seminar that if women are to participate fully in rural development they must not only acquire the skills of homemaking, child care and homecrafts, but must acquire the ability to plan, to make decisions, and to establish together with the entire family standards of better living. In order to accomplish better management of their farm and home enterprise, they must learn to utilize more effectively the resources available to their communities and families. It is essential that they have opportunities to learn about planning, budgeting, saving, credit facilities, banking, cooperatives and the functions of national and local governments. Consumer education and knowledge of the market place will soon begin to take on new importance as rural areas progress beyond subsistence farming.

To help fill the educational needs of women and family members, informal out-of-school education in the form of home economics rural extension services, village development, educational groups and training centres have been promoted by various ministries of Tanzania, to forward the cause of rural development. The educational programmes oriented toward young women, provide opportunities to prepare for the multiple roles they are expected to fill in their adult lives as Tanzanian citizens, wives, mothers, homemakers, farmers consumers, contributors to Tanzanian rural development and participating citizens of their communities and nation. The development worker with rural home economics training plays a major role in helping rural women to achieve their educational goals.

National Rural Development Programmes

The Ministry of Regional Administration and Rural Development is the government agency of Tanzania primarily responsible for rural development activities. Among its many tasks is that of stimulating and assisting villages to form development committees, and pursue village development activities. It maintains rural training centres for male and female

rural development workers, in addition to sponsoring shorter courses. Through its extension services it transmits knowledge of development skills such as building construction, road building, the management of enterprises for the rural people, including education for home and family life. In addition, the Ministry of Regional Administration and Rural Development coordinates field activities of other ministries serving rural communities.

Among these is the Ministry of Agriculture and Cooperatives which is planning to provide certificate and diploma-level training in home economics for women extension workers in several of their training institutes, and also to introduce nutrition education into the curricula. The health services conduct educational programmes for women and families through their dispensaries and clinics. The Ministry of Health and Social Welfare organize and conduct a 9-month course in applied nutrition. They also establish and maintain pre-school children day-care centres throughout the country. The Ministry of National Education has organized, with the assistance of UNESCO, a pilot work-oriented literacy programme which has as a secondary aim the improvement of home and family life.

There are approximately 1,700 rural development officers and assistants, 600 of whom are women. They organize and conduct programmes with rural families in a variety of subjects such as food preparation, nutrition, family clothing, childcare and feeding, hygiene and sanitation, home and family care, home improvement and home food production.

One of the main responsibilities of the Ministry of Regional Administration and Rural Development is the establishment of Ujamaa or socialist village schemes in which people farm and work collectively. Heretofore the population has been widely dispersed and reaching homesteads involved walking long distances through the bush. A typical tribal village may cover many square miles, consisting of a few small hamlets and scattered houses.

The establishment of the Ujamaa villages, it is hoped, will help to overcome some of these problems. In the new Ujamaa villages, it is easier to reach families and to organize community services and educational group activities. Assistance is being provided by the Government through agricultural loans for machinery, subsidies for improved housing, facilities for a portable water supply, passable roads to the village and other services aimed at better family and community living. Women rural development assistants and other workers are conducting educational programmes in these villages. There is little doubt that in such a settlement an integrated approach to rural development will be more effective.

It is also anticipated that every family will progress in its standard of living at about the same pace, that the fear of witchcraft will be lessened and better permanent housing and living conditions will result. Another outcome of this new village structure may be that the social security offered by an Ujamaa village will lead to gradual acceptance of new aims in relation to family size.

In countries where people live by subsistence farming, their peak capacity for earning is at their peak physical strength and thereafter it declines. This is in contrast with industrialized countries where men anticipate their earnings to increase with age and seniority until they retire on pension. Consequently, in Tanzania large families are normally considered as a blessing and an essential security for old age. It is hypothesized that members of Ujamaa villages may cease to fear destitution and this, coupled with the comparative emancipation of women, may result in changed attitudes and new norms in relation to small family size.

Home Economics Training

In recent years, with the help of UN specialized agencies, bilateral assistance and non-government organizations, a beginning has been made in developing home economics training activities for Tanzanian staff of the various ministerial services. The Home Economics Training Centre located at Buhare, was established in 1964 through Funds-in-Trust donated by the Swedish International Development Authority (SIDA) administered by FAO and technically

assisted by its home economists. Assistance was also received from UNICEF who provided equipment for the centre. During the seven-year period, 215 women were trained as rural development assistants and in addition 174 rural leaders received refresher or short courses. In February 1971 full responsibility for the centre was assumed by the Ministry of Regional Administration and Rural Development.4/

In spite of this special training, only a small proportion of the women rural development assistants now employed by the Ministry of Regional Administration and Rural Development have had post-primary home economics training and more than half had no training at all, not even in rural development techniques. The Buhare Evaluation Seminar recommended a crash programme of training for rural development and home economics for all untrained staff, with additional courses to be held in regional or district areas. Nevertheless, such a programme will only fill a short term need.

It has now been recognized by the Tanzanian Government that a long term plan for home economics in rural development is needed so that more adequate programming of services and training can be provided. The Ministry of Regional Administration and Rural Development have already requested an FAO consultant for one year to assist them in this task of evaluating and planning of their home economics needs for rural development and to help develop suitable programmes for the future. This task will be conducted in full coordination with a national ad hoc committee represented by all of the agencies concerned. This coordinated effort to develop a long term home economics plan should enhance the effective use of staff and training facilities.

It is recognized that more emphasis in the training of rural home economists must be given to planning techniques, especially in joint planning with community leaders and in helping families to learn to plan for all aspects of family and community living. A major difficulty in attempting to raise living standards is the constant mobility of the Tanzanian people. Surveys conducted by students at the Buhare Home Economics Training Centre, in villages adjacent to Musoma, reveal that in some communities immigrants compose as high as 85 percent of the population. Among the probable causes are the desire for fresh land to cultivate and the fear of witchcraft. There is an existing belief that a family who advances visibly beyond its neighbours, such as building a better house, may be subject to jealousy and illwill.

It has become evident that the popular approach of the teaching of home economics subjects through women's clubs or group seems to be becoming less and less effective. Response and participation have declined according to the recent national evaluation of women's programmes.5/

Home economics extension programmes for families in rural development must have sound educational objectives which utilize channels such as, women's sewing or gardening groups, not as an end in itself but as a means for reaching specific family life goals. Programmes to be effective must be oriented toward those family problems recognized by the family and the community. At the same time, sound educational approaches must be used to develop new personal and family resources.

Home economics should have the active participation and support of the men, if men and women are to strive together for better living standards. There appears to be no reason why women rural development workers should not teach men and women together about home and family life aspects, nor any reason why male rural development workers could not teach women about development and farming techniques. Agricultural extension agents should provide opportunities to both men and women to learn all new improved farm practices.

At the present time rural Tanzanian men are still reluctant to discuss matters of budget and money management with their wives oreven to discuss them in their presence. Such traditional attitudes must be studied carefully and changes introduced prudently based on a sound knowledge of behavioural patterns. Nevertheless, there are many other problem areas such as hygiene, home improvement, nutrition and child care, where joint education could be judiciously introduced. The long term outcome of this joint education should be for families to learn to plan together for the most favourable development of their children and all family members in terms of healthier and happier home environments. This includes the education and training for all members of the family, so that through self-development they can fulfil essential social and economic goals.

In response to the recommendations of the Buhare Evaluation Seminar a new programme of Planning for Better Family Living (PBFL), being sponsored by FAO, will be established at the Buhare Training Centre. 6/ Courses will be reoriented to reflect a new emphasis on helping families in rural areas to plan for all aspects of family living, taking into full consideration the implications of family size and child spacing. The programme funded by the United Nations Fund for Population Activities (UNFPA) will include action research, education, communications, training of field staff and action field programmes. 7/ It is planned that the programme will reach men, women, youth, village settlements and families, as it is integrated into every possible rural development programme.

Conclusion

Tanzania's vision of a better life for all is beginning to take on reality, as various ministries and agencies, governmental and non-governmental, begin to contribute to the health and general well-being of rural families. The courage to dare to introduce innovations in a highly traditional tribal society is beginning to reap benefits as more and more members join the Ujamaa village settlements. In spite of the many formidable limiting factors, lack of teachers, trained manpower and economic development, gains are being made in the development of programmes that can have an influence on the quality of life.

Most encouraging of all is the zeal for new activities in training of women workers for rural development, who in turn help village women to fulfil their family and farm and society responsibilities. Nevertheless, it will undoubtedly be a long time before women rural development workers of the appropriate level of education and competency are available for the whole country. For years to come international and external assistance in training activities will need high priority. Tanzania has already recognized the need for a national plan related to total family development, with appropriate policies and mechanisms for its implementation. A well coordinated national plan with stated objectives, manpower requirements, training needs, and operational procedures will be an aid to realistic country programming, and will surely be instrumental in helping Tanzania to continue responding positively to her people's call for a rural development - that is, for them, and with them.

References:

1/ It is estimated that there are ten women to every nine men. Tanzania's population density is 13.4 per square kilometre and the national annual population growth rate is 13.1 per cent. The urban rate is 6.1 per cent. The largest country in East Africa, Tanzania's population is about 12 million. About 95 per cent still depend on farming for a livelihood.

2/ The "Arusha Declaration", basis of the current 5-year Plan, aims toward equitable income distribution to be achieved through principles of self-reliance, self-help and cooperative community living.

3/ FAO/SWE/TF-39 "Seminar to Evaluate the Programme of the Home Economics Training Centre", Buhare, Musoma, Tanzania, 30 November - 7 December 1970. (FAO, Rome, 1971).

4/ The final reports of each FAO international home economics expert and the two project leaders are avilable.

5/ Evaluation Study of FAO/UNICEF-assisted Projects of the Ministry of Regional Administration and Rural Development - CEP Report No. 65, FAO, Rome, 1971.

6/ FAO - Planning for Better Family Living (NU:MISC/69/28), November 1969.

7/ FAO - Description of a FAO Demonstration Project Model in "Planning for Better Family Living" (PBFL) (ESN:TSFL/71/Inf.) 5-20 April 1971.

TRAINING FOR CONTROL OF THE DESERT LOCUST

by Gurdas Singh

Locusts are inveterate internationalists. They cross national boundaries without ceremony. Some species - in particular the Desert Locust - cross even deserts, mountains and seas, covering hundreds of kilometres in a few weeks. They devastate crops and wild vegetation, inflicting immense losses on countries and people. The problem of eliminating, or at least limiting, the threat of these insects to countries in the tropical and sub-tropical belt in Africa, Asia and Central and South America can only be dealt with on an international basis.

A common feature of all species of locusts is the irregular periodicity of their mass activity. For five, ten or more years any one species may exist as a harmless, solitary and relatively scarce insect, but sooner or later a population explosion occurs and the locust becomes exceedingly numerous and highly mobile and a swarming period sets in. Such plague periods last for a varying number of years. Of the different kinds of locusts, the Desert Locust is one of the most widespread geographically, one of the most dangerous to agriculture and probably the most difficult to control. The total area subject to periodical invasion by the swarms of the Desert Locust extends from India in the east to the Atlantic coast of Africa in the west, and from the Caspian Sea in the north to Tanzania in the south, and covers about 30 million square km.

Cost of Damage by the Desert Locust

Reliable methods have not so far been evolved to estimate the direct and indirect damages inflicted by locust plagues. However, even on the basis of the fragmentary information available, the direct damage appears to be striking indeed. For instance, in Morocco, damage to crops in the 1954/55 locust invasion was estimated at the equivalent of more than US$12 million. In Ethiopia alone, the Desert Locust destroyed in 1958, 167,000 tons of cereals valued at $10 million; and the consequent severe food shortage led to a near doubling of cereal prices. In the recent past, the damage in Iran, India and Pakistan exceeded a million dollars. The extent of indirect damage caused by the decline in the productivity of the soil, animals, forests - as well as men - on a long-term basis, would indeed be considerably greater.

Recent evidence indicates that areas liable to locust damage have increased as a result of the extension of cultivated areas. The total volume of crops susceptible to damage can be expected to rise as developing countries, which are subject to locust invasions, raise their agricultural output. The locust may therefore stand as a formidable barrier against the attainment of the targets of agricultural production in these countries. Success in accelerating agricultural output is, therefore, crucially dependent upon the extent to which the locusts can be controlled.

Some 18 years ago FAO initiated a project for the promotion and coordination of efforts against the Desert Locust in cooperation with national and regional organizations. Training and education formed an important part of the programme of work of the Project.

Need for International Approach

The continuous increase, in recent decades, of knowledge and understanding of the complexities and geographical scope of the problem posed by the Desert Locust and its control has shown the relative futility of a purely national uncoordinated approach

and the use of inefficient control measures. However, among some 40 countries which have suffered severe damage from invasion and breeding by this locust there was inevitably great variation in degree of understanding of the problem, in knowledge and experience of methods of control and in the funds and equipment available. Clearly these inequalities could only be eliminated by training, and the encouragement of an international approach. It was not to be supposed that the required degree of knowledge and international cooperation could be achieved in a short period, but it was felt that as much training as was possible should be done among those already working, or expecting to work on the Desert Locust, at both junior and higher levels, by international training courses and by awards to selected individuals for visits to research and control organizations in other countries. In addition to instruction and demonstration, the contact between representatives of many different nationalities with a common interest has proved to be a major contribution to increased international cooperation.

International Training Courses

A number of international training courses have been arranged during the last decade. These were designed to provide comprehensive basic knowledge of locust biology, ecology and bio-geography, modern control tactics and techniques for both ground and air operations, reconnaissance, reporting and plotting procedures, and the principles of the organization and administration of control campaigns. They were intended for staff or would-be staff of sufficiently high educational standards and ability to benefit from scientific and technical instruction, and to be able to pass on their newly acquired knowledge and understanding to more junior staff in their own countries. To these ends, emphasis was laid on practical work and demonstration to supplement the many lectures.

Nearly all the member countries in the Project availed themselves of the training offered by sending locust control officers or students to the courses. A total of 195 trainees attended from 35 countries. Reports on the training courses reproduced the texts of all the lectures. These will be useful to the trainees when they themselves become the lecturers and demonstrators in their own countries. They constitute reliable reference works by recognized authorities, with a strong practical bias, on the basic aspects of the Desert Locust problem.

While it is almost trite nowadays to remark that bringing together numerous persons of different nationalities for a specific purpose common to them all is highly beneficial, these training courses provided such outstanding examples of this benefit as to justify the remark. Not only did the subject matter of the courses, being highly specialized, tend in itself to create a feeling of common purpose, but many of the participants had up to that time only limited local experience previously and discovered that the common objective could be much more effectively reached by international coordination of effort using modern techniques than by adherence to older procedures in comparative isolation. Despite the smallness of the group this realization did a great deal to simplify cooperation, transcending national boundaries and considerations of a political or constitutional character.

Fellowships and Scholarships

In addition, training has been imparted through fellowships and scholarships which were intended for already experienced senior personnel of countries participating in the project, to enable them to undertake specific research on the locust or to broaden their experience of locust control. In all, 117 of these awards were made to candidates from 25 countries, enabling them to receive training in 24 organizations located in 16 host countries. The duration of the fellowships and the subjects studied, within the general theme of the Desert Locust and its control, varied considerably, from the short intensive course lasting one week on the theory and

practice of aerial spraying, to specialized research lasting for about a year in the United Kingdom. Some awards were made to permit candidates to attend the courses on the scientific basis of locust control organized and conducted at various national institutes.

In spite of the fact that a large number of locust control officers have been trained through courses and fellowship awards, there was still a need for advanced training to produce research scientists of a high calibre to man the field research stations and to handle the complex problems of Desert Locust control and research. Accordingly, a special programme was instituted to select B.Sc. (or preferably M.Sc.) students from various regions to go abroad for a period of two to three years. Under this scheme two fellows have already completed their studies in the United Kingdom and returned to their home countries. At present four students are studying in the United Kingdom and two in France. This training programme will be continued until each Member Country affected by the Desert Locust has at least one highly trained and qualified person to guide and conduct locust control and research with the requisite efficiency.

FAO is at present preparing a six year programme to meet future training needs. This is considered of the utmost importance by the FAO Desert Locust Control Committee, if the countries concerned are to be kept up-to-date with, and benefit from, technical advances, which may change radically the present concept of Desert Locust control.

THE HYDROLOGY TRAINING INSTITUTE (EPWAPDA*), BHAGYAKUL, EAST PAKISTAN

By: L.H. Young

Introduction

The two big rivers, the Ganges and the Brahmaputra, dominate not only the geographical scene but also the whole life of the people living in the Province of East Pakistan. The seasonal floods provide the basis for an intensive agriculture which in some parts of the province sustains as much as 3,000 rural people per square mile; however, these floods not only bring benefits but also widespread damage to life and property.

The two rivers form a highly complex hydrological system and before any serious attempt could be made to regulate the floods and develop controlled irrigation facilities, it was imperative to carry out a hydrological survey and to build up an intensive system of hydrological observations. For this purpose the Pakistan Government embarked on such a project in 1960 with UNDP and FAO help. This was followed by a second phase under the title of Second Hydrological Survey in East Pakistan starting in 1967. The purpose of this project was to consolidate, improve and expand the existing service in East Pakistan for surface water hydrology and climatology, with particular reference to training of personnel: to continue a programme of hydrological data collection and execute a model exercise in flood measurement; and to provide, so far as this is possible within the period and resources of the project, data required in the preparation of an integrated plan for the Province for flood protection, irrigation, drainage, reclamation and navigation. Basic groundwater studies already commenced would be continued.

In particular the project has undertaken:

(a) operation, improvement and expansion of the existing hydrological service

(b) improvement of supporting services

(c) provision of permanent hydrometric installations, facilities and accommodation at important long term observation stations

(d) training at all levels, by establishment and operation of a hydrological training centre, through "in-service" training and by fellowships

(e) continuous review of existing hydrological information and of the service for surface water hydrology and climatology in the light of immediate and future water development plans

(f) continuation of a regular programme of hydrological data collection

(g) execution of a model exercise in flood measurement.

Thus, as point (d) shows, training was an important component of this project and was carried out at the Hydrological Training Institute at Bhagyakul established in 1968. The training courses and the Field Training Centre were established at Bhagyakul on the River Padma for basic and more advanced training, for periodic refresher courses, and for imparting improved techniques in all aspects of practical hydrology including hydrometry, surveying, seamanship, field maintenance of equipment and all other practical operations and techniques required at hydrological observation stations in East Pakistan. These courses are a regular feature of the operation of the Hydrology Directorate of EPWAPDA and are supplemented by training for selected categories in non-hydrological subjects such as law, finance and administration. These supplementary courses are arranged in collaboration with the EPWAPDA Engineering Academy at Kaptai.

* East Pakistan Water and Power Development Authority.

In 1969 the writer joined the project as an Engineer Hydrologist mainly for the purpose of strengthening training activities at the Institute.

The Hydrological Training Institute

The role of the Institute is to give "in-service training" for the staff of EPWAPDA itself; thus its training is oriented mainly towards practical matters. The teaching staff consists of permanent lecturers who have been at the Institute since inception in 1968. Support has been received from visiting teachers and from the experts employed in the project. Two types of major courses are held, one designed for Assistant Engineers and the other one for Assistant Technical Officers. The ATO's hold a science degree which is obtained after a shorter course of study than that necessary for the engineering degree. They had all been employed in EPWAPDA for periods ranging from 18 months up to 10 years.

Although the ATO's seem to have a uniform technical background, it was found that their technical ability and experience cover a much wider range than might be expected. In general the older man with longer experience was more able. Each new class of trainees had standards of response and academic knowledge that could only be ascertained after teaching began. It was necessary to start at the right point, but difficult to know this in advance. Only after several days of teaching did the lecturers gain some idea of the ability of the class. In the case of visiting lecturers who stayed for short periods, the degree of understanding of the students was evaluated only after the lecturer had finished, or perhaps no evaluation was made at all. It was, therefore, suggested to visiting lecturers that they should precede their instruction by a short written question paper which could be answered in about 10 minutes. This was one way of assessing the ability of the class.

English, the working language of EPWAPDA, has been used for most of the tuition. Generally speaking, students had a good knowledge of the language although some difficulties were experienced. It is often said that Bengali is not a suitable language for technical work but is nevertheless noticed that the counterpart teachers have no difficulty in giving detailed technical explanations using Bengali with the occasional English word.

The tone of work at the Institute has been enthusiastic and serious. This was important because the teacher/student ratio is slightly less than 1:2 and this meant that the training was costly. The number of trainees varied between 8 and 13.

Syllabus and Courses

Four courses had been designed for the Institute: Basic Training Course; Special Survey Course; Special Processing Course; Advance Hydrology Course.

When the writer joined the project the contents of the courses were already well established and tried by experience and no major changes were found necessary. He did, however, institute the practice of holding an examination at the end of each course and also arranged for each of the students to give a lecture on a subject of their own choosing.

The Basic Training Course was held most frequently. There was pressure to increase the number of topics which would have produced a tendency to overcrowd the course. The course is at present 8 weeks long and there is evidence that such a duration in the isolated location of Bhagyakul is something of a strain on the trainees. It is realized that consideration should be given to breaking the course into two parts of 5 weeks each thereby making it possible to extend the range of subjects without overstraining the trainees.

Rightly, in the past, great emphasis has been given to practical field work. This could reasonably be reduced somewhat if it is found that the general standard of field work in the Directorate continues to improve as a result of the experience and influence of those officers who have already passed through the Institute.

It was originally the intention that Assistant Engineers should be trained with ATO's in these courses. However, the writer recommended that a separate course be held for Assistant Engineers and this was adopted in 1970. The course followed the pattern of the Basic Training Course with somewhat less field work.

The Special Processing course and the Advanced Hydrology Course were designed as continuations of the Basic Training Course with some overlap for refresher purposes. These more advanced courses are essential in order to keep a high standard of achievement in the Directorate. At the same time they will be necessary to the work of the new Division of Research and Training referred to below.

The subjects taught and the level to which they should be taken are shown in the table.

Follow-up and Recommendations

EPWAPDA has a current proposal to set up a Directorate of Research and Training, which will include within its purview the Processing Division, the Training Institute and a Research Division. The Research Division will, inter alia, conduct studies on an experimental catchment and evaluate the methods of gauging and processing. This is very much to be commended and will provide the required liaison between the related Divisions, in addition to indicating how to obtain the maximum information with the most efficient methods.

As a result of his experiences on the project the writer has made a number of recommendations which aim at improving the efficiency of the Institute. The most important amongst these relates to the changes necessary in the organization of courses to reflect changing demands made on the Institute. Accordingly it has been recommended that:

> "The courses should continue as at present with adjustments for the changing needs of students. The Basic Training Course will in future be needed less as most of the ATO's have received it. This will allow more advanced courses to be held, and this is strongly recommended but it was recognized that small adjustments and improvements should continue in the future to prevent the course from becoming too rigid."

> "In addition seminars can be held for higher ranks and the more promising officers in the junior ranks. These seminars can be a combination of instruction, free exchange of opinion and information together with lectures given by all participants. The lectures should be followed by questions and answers. Written participation could also be presented and discussions be recorded."

> "When any of the permanent teaching staff are transferred, the incoming officer should have one month at the Institute with the officer whom he is to replace while a course is running. Before that time he can act as a visiting lecturer."

Recommendations have also been made concerning improvements in teaching methods. It would be profitable if greater use could be made of visual aids and it is considered that draughtsman should work with the lecturers to produce wall posters illustrating various themes and processes. An interesting task for the trainees would be to produce such visual aids themselves.

Once a week trainees and teachers should mutually review the week's work.

It is recommended that a written set of lecture notes be prepared for each subject with indications of the amount of material to be included in each course.

Lessons of Experience for other Projects

Hydrology as a science is relatively new in all countries, not only in East Pakistan. A large hydrological network has been set up there but many improvements and adjustments have naturally still to be made. The basic goal of the training in the institutes must be to impart not only technical knowledge but also a desire for analysis, criticism and improvement. Much of this needs to be reflected by methods of training which may be described as a change from a "spoon feeding" to a "discovery" approach. One of the important components of this search for new teaching methods is the recognition that in this modern fast-changing world there is a need to continue learning throughout a professional's life. Re-training has become essential in order for the professional man to bring himself up-to-date.

Another new fact is the revolt of the student class, and this has affected the Institute at Bhagyakul as elsewhere. In general this is the rejection by young people of the social conditions which they are finding all over the world. This, in one sense, disturbs the educational process and makes it apparently more difficult to make progress; but on the other hand it does loosen up the rigidity of the traditional systems which might otherwise stagnate. A short review of each week's work in which teachers and trainees express opinions and offer suggestions is valuable in this context.

Apart from teaching the actual techniques of Hydrology at the Bhagyakul Training Institute the writer has tried to introduce a new approach on the lines indicated above. In this region of the world there is an ancient tradition of learning. Certain patterns of thinking and teaching are very well established and although this makes for a higher degree of scholarship it can take time to introduce changes.

SUBJECT AND LEVELS OF THE VARIOUS COURSES

Subject	Basic Training Course	Special Survey Course	Special Processing Course	Advance Hydrology Course	Asst. Engineer Course
1. Hydrology	B	-	B	A	A
2. Hydraulics	B	-	A	A	A
3. Flow in Open Channels	B	-	A	A	A
4. Rating Curves	B	-	A	A	A
5. Fluvial Hydraulics	B	-	B	A	A
6. Data Processing	B	-	A	A	B
7. Tidal Survey and Computations	B	-	B	B	B
8. Measurement Techniques	A	-	-	-	A
9. Rainfall and Flood Studies	-	-	B	A	-
10. Survey, Land and Hydrographic	B	A	-	A	A
11. Report Writing, Applied Hydrology	-	-	-	B	-
12. Statistics	B	A	A	A	B
13. Seamanship and O/B Engines	B	-	-	-	B
14. Station Management	B	-	-	-	B

A = Advanced Level B = Basic Level